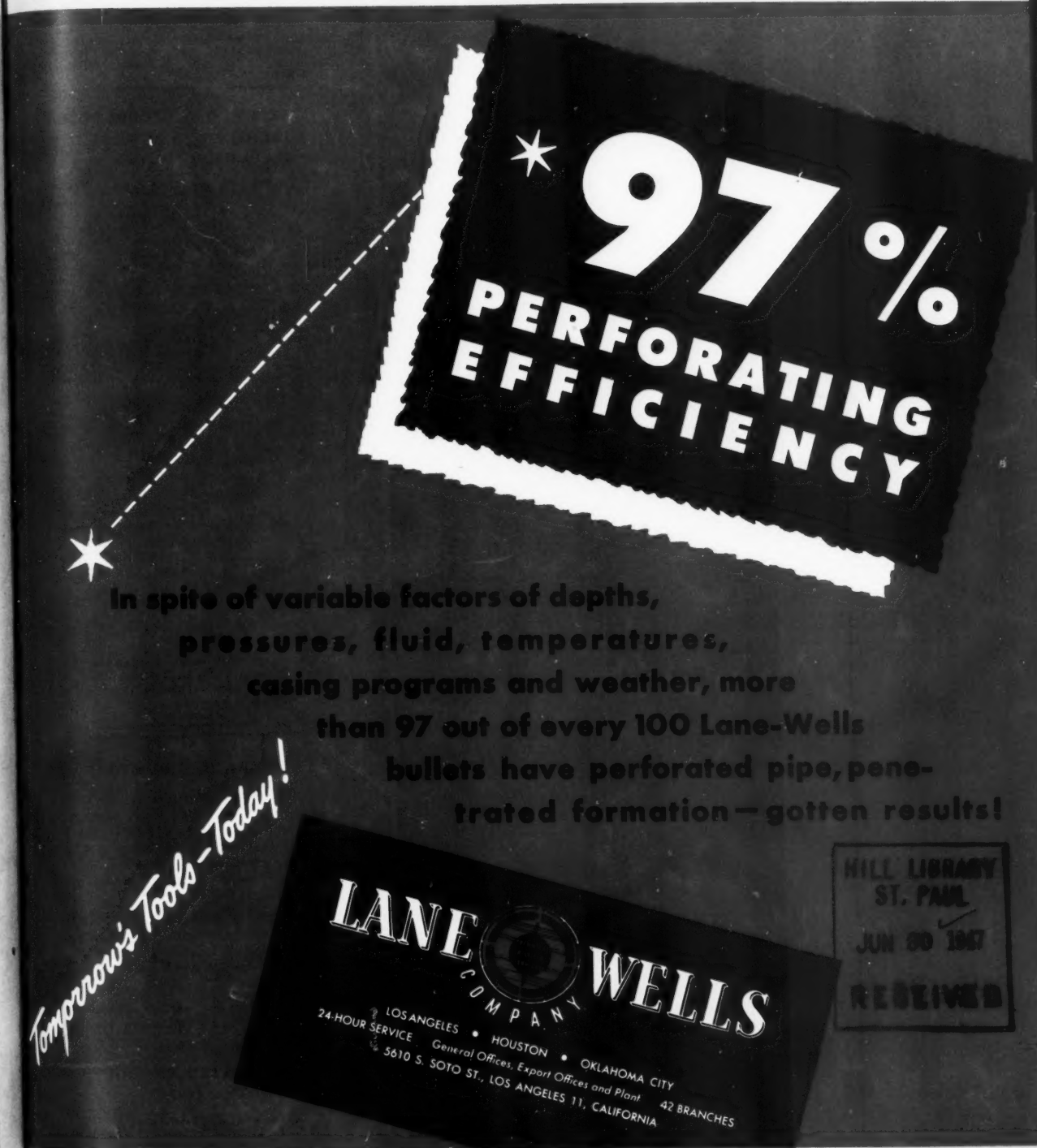
the OIL AND GAS JOURNAL


97%
PERFORATING EFFICIENCY
In spite of variable factors of depths, pressures, fluid, temperatures, casing programs and weather, more than 97 out of every 100 Lane-Wells bullets have perforated pipe, penetrated formation—gotten results!
Tomorrow's Tools—Today!
LANE WELLS COMPANY
LOS ANGELES • HOUSTON • OKLAHOMA CITY
24-HOUR SERVICE General Offices, Export Offices and Plant 42 BRANCHES
5610 S. SOTO ST., LOS ANGELES 11, CALIFORNIA

HILL LIBRARY ST. PAUL JUN 30 1947 RECEIVED

PRICE 20 CENTS TABLE OF CONTENTS PAGE 71 JUNE 28, 1947

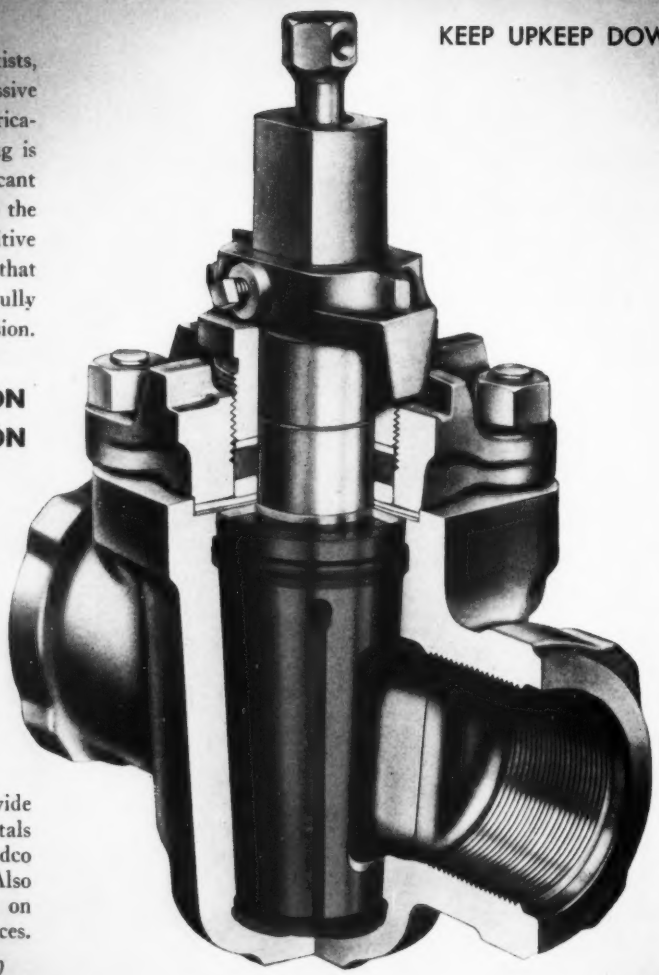
Pressurized lubrication
GUARDS AND PROTECTS THIS VALVE IN VIRTUALLY EVERY PETROLEUM SERVICE

KEEP UPKEEP DOWN

Where metal-to-metal movement exists, only lubrication will prevent excessive wear. In the Nordstrom valve, lubrication protects *at every turn*. The plug is *encased* in lubricant. The lubricant screw applies pressure to prevent the plug from galling and to form a positive seal around each port. It is obvious that the vital parts of the valve are fully protected against erosion and corrosion.

"SEALDPORT" LUBRICATION GIVES 4-WAY PROTECTION

- . . . SEALS THE VALVE
- . . . PREVENTS STICKING
- . . . PROTECTS THE SEAT
- . . . PROLONGS VALVE LIFE



Petroleum engineers are offered wide latitude in the specification of metals and alloys—including semi-steel, Nordco steel, stainless steel and bronze. Also Merchrome coating, a hard-facing on both plug and contacting body surfaces.

Request descriptive Bulletin V-200

Nordstrom
LUBRICATED VALVES

NORDSTROM VALVE DIVISION — ***Rockwell Manufacturing Company***

Main Offices: 400 North Lexington Avenue, Pittsburgh 8, Pa., Atlanta, Boston, Chicago

Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa

. . . and Leading Supply Houses

Export: Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

FOUNDED IN 1910 BY PATRICK C. BOYLE

Subscription rate to the petroleum industry, United States and foreign, 1 year, $3.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1947 by The Petroleum Publishing Co.

Vol. 46, No. 8 June 28, 1947

P. C. LAUINGER, *President*
C. O. WILLSON, *Editor*

S. H. ROURKE, *Business Manager*
KENNETH B. BARNES, *Engineering Editor*

R. C. MAC DOUGALL, *Circulation Manager*
ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor*
PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS
NEIL WILLIAMS
CHARLES J. DEEGAN
R. B. TUTTLE
DAHL M. DUFF
D. H. STORMONT
C. DUDLEY JOHNSTON, *Staff Artist*

District Editors

T. A. ARMSTRONG, TRUMAN P. MOOTE — Tulsa 1, *211 S. Cheyenne*
GEORGE WEBER, CARL F. HOOT — Dallas 1, *Mercantile Bank Bldg.*
LEIGH S. McCASLIN, JR. — Tulsa 1, *211 S. Cheyenne*
O. C. PRESSPRICH — Saginaw, *News Bldg.*
E. H. SHORT, JR. — Houston 2, *Sterling Bldg.*
HERNDON DAVID — Los Angeles 15, *1406 S. Grand Ave.*
WARREN W. BURNS — New York 17, *415 Lexington*
HENRY D. RALPH — Washington 4, *Nat'l Press Bldg.*
TOLBERT R. INGRAM — Denver 11, *4556 Alcott St.*
VICTOR LAURISTON — Chatham, Ont., *35 Stanley Ave.*
P. DE ARMOND, *Editorial Assistant*

Advertising

WAYNE RIVES, *Manager*

MITCHELL TUCKER, *Eastern Manager* — New York 17, *415 Lexington Ave.*
C. R. FARMER, *Chicago Manager* — Chicago 2, *105 W. Madison*
ALFRED MILTON JONES, *New York Representative* — New York 17, *415 Lexington Ave.*
E. S. KLAPPENBACH, *Chicago Representative* — Chicago 2, *105 W. Madison*
J. HOWARD TINKHAM, *California Manager* — Los Angeles 15, *1406 S. Grand Ave.*
CHARLES A. WARDLEY, *Pittsburgh Manager* — Pittsburgh, *435 Fourth Ave.*
JOHN D. REILLY, *Tulsa Representative* — Tulsa 1, *211 S. Cheyenne Ave.*
J. PARKER HOLLAND, *Production Manager* — Tulsa 1, *211 S. Cheyenne Ave.*
A. J. CHAMBERS — Beckingham, Kent, England, *33, The Avenue*

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

U. S. Wins "Tidelands" Case in Far-Reaching Decision 74
"Tidelands" Operators Asked to Continue Production 74
Export Controls Reinstated; Russian Shipments Draw Fire .. 75
Industry's 1947-48 Outlay Placed at $4,000,000,000 75
Cooperative Processing Attacked in Cotton Valley Suit 76
Inflated Postwar Demand Causes Pipe-Supply Difficulties .. 78
Supply Prospects Improve; Rigid Contracts Obstacle 82
Rizley Bill Substitute Submitted to Congress by FPC 85
Watching Washington 86
Present Prices Generally Adequate, Holman Tells Group 87
Explosion Damages Los Angeles Harbor 87
Texas Independents, Sinclair Present Case Against Treaty... 91
Arguments Heard in Seeligson Case 91

Editorial 73
This Week 77
International News 80
Natural-Gas News 153
Refining News 155
Pipe-Line News 158

ENGINEERING AND OPERATING

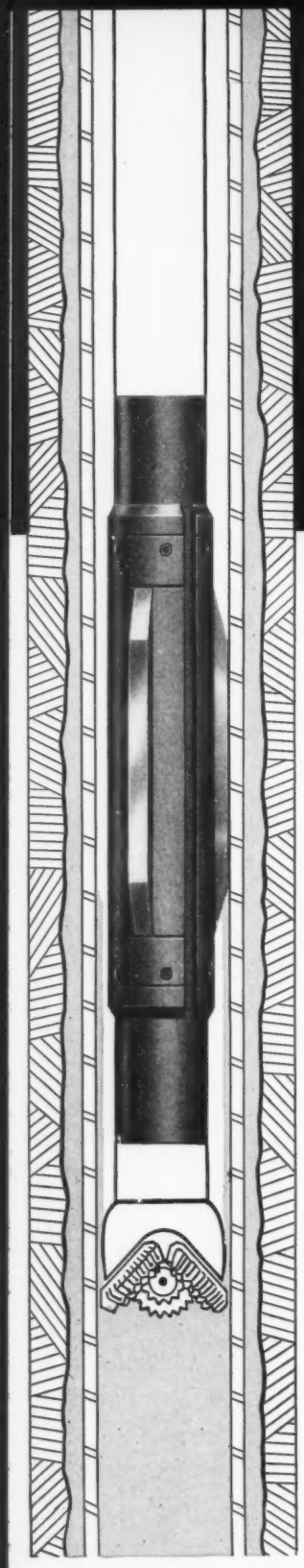
Forestalling Equipment Breakdown by Maintenance 96
Effect of Bacteria on Oil Production—Part 2 101
Corrosion Research at Ocean Laboratory 107
Holding Up the Off Shore Drilling Rig 112
Book Reviews 119
Effect of Oil on Petroleum Waxes 121
American Chemical Society Digests 124
Corrosion in Gas Condensate Wells—Part 2 127
Questions on Technology 144
Modern Rotary Drilling—No. 26 in a Series 147
The Refiner's Notebook—No. 150 in a Series 149
Engineering Fundamentals—No. 290 in a Series 151

EXPLORATION AND DRILLING

Light Oil Strike Near Santa Maria 163
Reports by Areas Start on Page 163
Summary of May Completions 178
Weekly Well-Completion Record 182
Daily Average Production for Week 183

ADDITIONAL FEATURES

Personals 93
Deaths in the Industry .. 95
Drilling Contractors 179
Market Summary 184
Equipment Men in News. 185
Classified Advertising ... 187
Events on the Calendar .. 192
Advertisers' Index 192



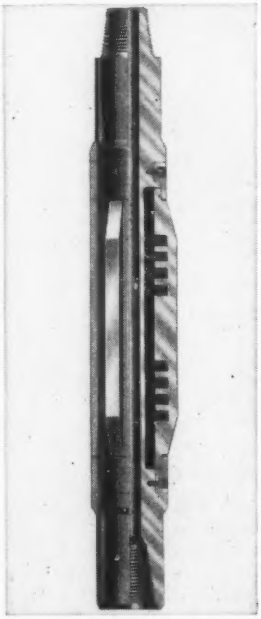
How is the "Working Surface" of your Casing?

UNLESS the inside of your casing—the working surface—is smooth and clean, there is always a hazard of encountering difficulties in future down-hole operations. The use of a Baker Casing Scraper eliminates this hazard, for it effectively removes all obstructions from the inside of the casing, leaving it smooth and clean to its full I.D.

The time to do a scraping job on your casing is while the equipment still is up and the crew still on hand. It's then a simple matter to include a Baker Casing Scraper in the string as a "follow-up" behind the bit when running-in to drill out cement. Thus, in one operation, it is possible to remove the hardened cement, scale, sharp burrs from gun-shot holes, or other obstructions which might later damage packers, swabs and similar tools.

Why you should be using the BAKER ROTARY CASING SCRAPER

(Product No. 620)



EASILY USED BY YOUR CREWS—Simply include Casing Scraper in the string when the bit is run to drill out cement.

MAKE SURE CASING IS CLEAN AND SMOOTH—While the equipment is still up, and the crew on hand, scrape casing to leave it in perfect condition for future operations.

MAKES FUTURE WORK SAFE AND EASY—Leaves casing its full I.D., free from hardened cement or other obstructions which damage packers, swabs, bailers, or other tools.

REMOVES SHARP BURRS FROM GUN-SHOT HOLES—The Baker Casing Scraper is strong enough to cut away all such obstructions which interfere with subsequent operations.

MAY COST A LOT *NOT* TO RUN IT—Damage to packers or swabs, plus delays and re-running expense can easily cost a lot more than the reasonable rental.

LOW-COST RENTAL—Serviceman is not required, and the rental price is reasonable.

It is not necessary to worry about maintaining exact hydraulic pressure to expand the blades of a Baker Casing Scraper. Simply use all the springs behind all blades when you want to remove burrs from gun-shot holes, and similar "hard" scraping; use only part of the springs when you have paraffin and similar soft substances to scrape away. Blade pressure is then automatically controlled—all you need to do is "turn to the right."

BAKER

OIL TOOLS

BAKER OIL TOOLS, INC., LOS ANG

THE OIL AND GAS JOURNAL

A Final Challenge

WE have devoted many pages in the Journal over the past year to news and interpretative comment concerned with the extension of Federal Power Commission controls over natural gas.

During this period FPC was sustained by a lower court in its contention that under the Natural Gas Act its interstate powers extended to the production of natural gas. While a test case was pending before the Supreme Court companion bills were introduced in the Senate and the House which as a law would restrict the commission's powers to the transmission of natural gas in interstate commerce as intended by those responsible for the enactment of the original act.

Last week the Supreme Court decision confirmed the worst fears of those who had been termed "alarmists" by fellow operators. The highest court not only approved everything that FPC had done in the case at issue but made clear the commission has powers which so far it has not used. The decision makes no attempt to differentiate as to classes of producers and in effect stated FPC must exercise regulatory powers over all production of gas ultimately disposed of in interstate commerce.

Every natural-gas producer, by now, must know what this means.

If the gas he produces is transmitted to outside markets his wells become part of a production, gathering, and transmission operation, all parts of which are subject to the controls of a Washington agency including price at the well head as part of the rate making.

Furthermore where oil is produced with the gas it would appear that under the court's decision the two cannot be separated in arriving at costs. Thus crude oil comes within the scope of the FPC regulation.

It is true that the Supreme Court held that the FPC regulations do not apply where they would be "inconsistent or a substantial interference with the exercise by the State of its regulatory functions." It does not appear that this restriction offers relief in this most important step in recent years looking toward federal control of natural-gas operations.

There are many aspects to this latest development in the control of natural-gas operations including the direct threat to consumer supplies. Producers are not going to sell their gas if their entire operations are to be subject to the regulatory whims of a commission which now has all the authority it ever asked for and more.

There are about 30 days left to secure favorable action by Congress on the Rizley bill which is now ready for favorable action by a House committee. To secure passage of the bill in the final days of this session of Congress is the challenge now confronting the petroleum and natural-gas industries and their millions of customers.

U. S. Wins "Tidelands" Case in Far-Reaching Decision

WASHINGTON. — The Supreme Court ruled June 23 that the federal Government rather than the State of California owns title to the bed of the ocean between the low tide mark and the 3-mile international limit, and the right to extract oil from that area.

The ruling apparently is equally applicable to oil developed off the coasts of Texas and Louisiana, since the opinion was based on a broad concept of national dominion and sovereignity rather than specific provisions under which individual states entered the Union. The ruling was a 6 to 2 decision. Justices Reed and Frankfurter entered separate dissents, and Justice Jackson did not participate.

The decision leaves unsettled many questions, such as the exact boundaries between the so-called marginal sea and the limits of bays and harbors, and what is to happen to oil producers under state lease and others who are now classed as trespassers on federal property. The court asked the federal and state governments to draft the terms of a proposed decree which the court said it will enter on September 15.

Another Quitclaim Bill Likely

The court also indicated that congressional legislation will be needed to settle some of the problems. This undoubtedly will lead to an attempt to renounce federal claims entirely, as Congress did last year in a resolution vetoed by President Truman. Meanwhile the Justice and Interior departments were preparing statements outlining interim procedure and it was expected that no positive action would be taken to interfere with oil production from current operations at least until the final decree is entered.

The majority opinion was read by Justice Black, who said the crucial question is not merely who owns the bare legal title to the lands under the marginal sea, since the federal Government asserts claim in two capacities transcending those of a mere proerty owner—its dominion necessary to protect the United States and also as a member of the family of nations.

Of the scores of court decisions relied on by California, the court concerned itself almost entirely with the Pollard case in which the State of Alabama won title to lands beneath inland navigable rivers and bays, and said that under the "equal footing" provision by which subsequent states entered the Union California has a qualified ownership over inland navigable waters and even tide lands to the low water mark.

A Function of National Sovereignity

The 13 original states, Black said, acquired elements of sovereignity over the 3-mile belt from the English Crown by virtue of the Revolution, but it cannot be said that they separately acquired ownership of it. He said at the time of the Revolution there was not settled international custom or understanding on this matter and international acceptance of the 3-mile limit was accomplished by the federal Government after formation of the nation, and its control is a function of national sovereignity.

There is some support for the state control over the bottoms of harbors and rivers but this is not so as to the ocean bottom, the court said, since the oil there itself might become a subject of international dispute and peace and commerce are the paramount responsibility of the national Government. State local police powers over a part of the 3-mile belt do not detract from the federal right and power, the court said, and it would not transplant the Pollard rule of ownership as an incident to state sovereignity in relation to inland waters out into the soil beneath the ocean which is so much more a matter of national concern.

Paramount Federal Rights

All Supreme Court decisions since the Pollard case have been paraphrases of it and have not laid down a new rule as to the open ocean, and this question has never been presented, Black said. He added that now that the question is here, it is decided that California is not the owner of the 3-mile marginal belt along its coast and that the federal Government rather than the state has paramount rights in and power over the belt, an incident to which is full dominion over the resources of the soil under that area, including oil.

California had argued that any federal claim had been forfeited by failure to assert it earlier, but the court said that the interests of federal Government are not subject to the ordinary rules of law as to private ownership. He admitted that evidently some federal offices believed California had title, since some of the lands were purchased for federal purposes and the Interior Department denied it had power to issue oil leases, but he said the interests of the federal Government are not forfeited as a result.

Mistaken Assumptions

Noting that many improvements have been made on this submerged land, Black said their aggregate value is small in comparison of the tremendous value of the entire area and the case cannot turn on expenses incurred on mistaken assumptions. He also said the boundaries of the area are still to be determined and that the court cannot assume that Congress will fail to do justice to innocent parties involved.

Reed's dissent asserted the thirteenth original states owned the marginal sea as a sovereign right and all other states are on an equal footing, and that this does not interfere in any way with the needs or rights of the federal Government in peace or war. Frankfurter said the paramount rights of national dominion are not involved in this case and that the majority denied California the proprietary ownership of the land but did not give any basis for claim of federal ownership. He concluded that the area is now unclaimed land and its disposition is a political decision to be made by Congress and the president rather than the courts.

Operators Asked to Continue Production

WASHINGTON. — Much litigation and legislation will be required to straighten out the confusion as to offshore oil production as a result of Monday's Supreme Court decision vesting title in the federal Government to the ocean bed below the low-tide mark.

Acting as though they were unprepared for the decision, officials of the Justice and Interior departments at once went into a series of conferences but were unable to state what the next steps would be.

Attorney General Clark issued a statement saying that "in view of the current shortage of oil and the necessity for maintaining full production I am certain producers in the affected area will continue the wells in operation. I am confident that satisfactory arrangements will be reached so that producers who carry on will not be adversely affected by so doing."

Royalties May Be Impounded

This was interpreted to mean that present operators under state leases will not be prosecuted as trespassers since they acted in good faith and that the federal Government will recognize their right to continue production, at least for the time being. How-

ever, they apparently have a new landlord, and there was a possibility that royalties heretofore going to California and coastal cities may be impounded as of noon June 23 until the federal Government decides whether or not to claim them.

The Interior Department has no statute under which it can issue drilling permits for offshore lands, since such lands are not at present a part of the public domain covered by the General Leasing Act. Therefore, there can be no immediate action on applications for leases filed with the department in recent years nor on any new ones which may be filed. Since California no longer has title it cannot issue new drilling permits, so it would appear that there can be no more off-shore drilling until new legislation is enacted.

Gulf Coast Status in Doubt

Whether or not the same situation applies to the Texas and Louisiana coasts is a big question. The court's decision appears to apply to the ocean bed off all states, and it is assumed that the federal Government will make such a claim. This undoubtedly will be fought in the courts by Texas. But meanwhile, operators under state permits issued after June 23 may be in jeopardy.

Several congressmen immediately demanded legislation nullifying the decision, but a veto was foreseen.

Stop-gap legislation to provide some sort of administration of the area until permanent plans are made may be attempted, but this most likely would become entangled with demands that the federal Government renounce its windfall entirely.

Much litigation is in prospect to determine the limits of bays and harbors which the Supreme Court apparently said are in a different category from the marginal sea proper. Broad principles for making such demarcation may be laid down in the decree which the Supreme Court intends to enter September 15 after obtaining suggestions from state and federal governments, but thousands of individual surveys and court cases might be needed for final settlement of all disputes.

Union Announces Boost in California Crude Prices

An increase in price for California crude oil ranging from 7 to 30 cents a barrel was announced June 24 by Union Oil Co. of California for fields in which it purchases.

Observers expected other California purchasing companies to follow the increase immediately. At the same time, Reese H. Taylor, Union president, said the price of heavy fuel oil would be increased 35 cents a barrel, to $1.80 at Los Angeles harbor.

Export Controls Reinstated After Russian Shipments Draw Fire

WASHINGTON. — Export controls have been reinstated on petroleum products to all destinations except Canada, effective June 30, the Office of International Trade of the Commerce Department announced following a series of interdepartmental conferences.

Export licenses will be required for all export shipments of motor fuels including gasoline and aviation gasoline, kerosine, gas oil and distillate fuel oil, residual fuel oil, and blending agents of petroleum origin. Similar controls were in effect during the war but were removed in September 1945.

The new controls will become effective just 24 hours before the export control law is due to expire. Congress is considering renewal of the law, and this action may be designed to aid passage since many in Congress have been highly critical of uncontrolled shipments to Russia from West Coast ports.

Export licenses will not necessarily stop all Russian or other exports, but shippers may be limited to a percentage of previous exports.

The department stated that export control is necessary if the domestic supply is to be protected and exports are to be used most effectively, noting that civilian consumption has increased greatly and some Army, Navy, and federal and state government civil requirements are unfilled. It added that export control will not solve the problem since exports are normally less than 10 per cent of domestic consumption and some exports must continue, so this action does not reduce the need for all possible conservation measures.

In a separate announcement the department stated that during the first four months of 1947 imports of crude and petroleum products averaged 393,299 bbl. per day and exports 397,437, which made imports 25 per cent above the same period of last year and exports 2 per cent higher than 1946.

Industry 1947-48 Outlay Set at $4,000,000,000

WITH more than $4,000,000,000 in capital investments to be made by the petroleum industry during 1947-48, William R. Boyd, Jr., president of the American Petroleum Institute, said last week that approximately $2,000,000,000 will be spent in production (including exploration and acquisition of prospective producing lands); slightly more than $1,100,000,000 in refining; and about $440,000,000 in transportation. Approximately $480,000,000 will be spent in marketing, he said, and about $75,000,000 for miscellaneous purposes.

This projected capital investment for 1947-48 is based on a survey of a number of companies which have actually budgeted outlays in the period totaling more than $3,000,000,000. An outlay of this magnitude will represent more than 22 per cent of the total investment of about $18,000,000,000 in the oil industry—which is the country's largest.

Record Footage in Prospect

Of primary importance in production will be the search for new oil reserves through exploratory operations, where costs have shown a threefold increase as compared with 10 years ago. Total well drillings of all kinds by the industry this year will approximate 35,000, including those for exploratory purposes.

Boyd pointed out several factors account for the industry's current record expenditures. One is the unprecedented growth in demand for products which has reached levels far higher than had been anticipated, and another is inability to proceed with normal expansion programs because of the war.

Higher Costs a Major Factor

Also accounting in part for the higher expenditures are increased labor and material costs. Development costs of producing oil are far in excess of prewar figures; refinery equipment which cost $400 a barrel of capacity prewar now costs more than $1,000 a barrel; pipe lines which cost $12,000 a mile now cost $30,000 a mile, and marketing facilities cost more than twice as much as prewar.

The largest expenditures in 1947 and 1948 will be in production, the finding, and developing of new reserves. One group of companies, for example, will spend close to 1 billion dollars in the production division alone in the 2-year period, and the total amount spent by the entire industry in this category probably will account for around 45 per cent of the over-all capital outlays.

Cooperative Processing Attacked in Cotton Valley Suit

by George Weber

MARKING the first government attack on unitized pressure-maintenance operations, an antitrust suit filed last week by the U. S. Department of Justice against members of the Cotton Valley Operating Committee is attracting the wary interest of the entire industry. (Filed in the federal District Court in Shreveport, the petition charges violation of the Sherman Act by 15 companies and 18 individuals who allegedly have combined and conspired jointly to engage in and exclude others from refining, distributing, and selling distillate products withdrawn from the North Louisiana field. Early this week, none of the defendants had yet been served.

The alleged offenses charged in the petition follow:

Language of the Petition

"Said combination and conspiracy has consisted of a continuing agreement and concert of action among the defendants, the substantial terms of which have been and are the defendants:

"(a) Agree to jointly engage in and exclude others from the business of extracting, processing, and refining various separate hydrocarbons and hydrocarbon products from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from said field and not reinjected therein, which said business of extracting, processing, and refining was in addition to that required to separate said hydrocarbons from said natural flow or to reinject the residue thereof into the field;

"(b) Agree to jointly engage in and exclude others from the business of distributing and selling all of the hydrocarbons and hydrocarbon products jointly extracted, processed, or refined by the defendants from over 85 per cent of the natural flow of liquid and gaseous hydrocarbons produced from the field and not reinjected therein.

"(c) Agree to jointly sell through channels of distribution jointly selected by the defendants all of the hydrocarbons and hydrocarbon products extracted . . .

"(d) Agree upon fixed and uniform prices and terms and conditions of sale for each of the hydrocarbons and hydrocarbon products extracted . . . and agree to sell each of said hydrocarbons and hydrocarbon products at the said fixed and uniform prices and upon said terms and conditions of sale."

Comments on the Government's position in the Cotton Valley case are found in Watching Washington, page 86.

A Civil Action Only

The suit does not allege criminal violation of antitrust law; it is a civil action which asks no penalties and seeks only to enjoin and restrain the defendants from continuing the practices with which they are charged. The petition asks that the court adjudge and decree:

1. "That pursuant to Section 5 of the Sherman Act writs of subpoena issue, directed to the defendants named herein, demanding that they appear herein and answer the allegations contained in this complaint and thereafter abide by and perform such orders and decrees as the court may make and enter.

"That the aforesaid combination and conspiracy in restrain of and to monopolize interstate trade and commerce in the liquid and gaseous hydrocarbons taken from the Cotton Valley field not reinjected therein, is unlawful . . .

"That the defendants herein . . . be perpetually enjoined and restrained from in any way conspiring, contracting, or otherwise acting in concert with one another or with other persons or groups of persons for the purpose or with the effect of continuing said combination and conspiracy, or of entering into or effectuating any similar combination or conspiracy.

"That the defendants . . . be required to cancel and abrogate all existing arrangements, understandings, and contracts, entered into pursuant to or in furtherance of said conspiracy, for the sale of hydrocarbons and hydrocarbon products extracted, processed or refined by the defendants from the natural flow of liquid and gaseous hydrocarbons taken from the field; and that they and each of them be perpetually enjoined and restrained from agreeing among themselves as to the price, terms, or conditions at which any part of said hydrocarbons and hydrocarbon products shall be or should be sold, or agreeing to sell or selling any part of said hydrocarbons or hydrocarbon products through or to any common, joint, or exclusive sales agent, broker, refiner, pipe-line company, or other sales or distribution medium.

"That the defendants . . . be perpetually enjoined and restrained from engaging jointly in the extraction, processing, or refining of hydrocarbons or hydrocarbon products from the natural flow of liquid and gaseous hydrocarbons taken from the field, except in so far as such extraction, processing, or refining are essential to the separation of liquid and gaseous hydrocarbons from the field and the reinjection of the residue thereof into the field for the purpose of achieving ultimate recovery therefrom."

Processing Attack a Threat

Despite its restriction to one specific group of defendants and the mild action sought, the case is considered by many in the industry to constitute a genuine threat to the successful form of conservation which such unitized projects represent. Although it does not attack the basic functions of unitized cycling, production of gas and distillate, separation of liquids from gas and return of gas to the reservoir, it does seek to prohibit the cooperative processing of stabilized distillate. This, in the belief of many, is the vital issue involved. The fractionation of distillate into finished products is a logical operational extension of the stabilization process, which greatly enhances the market value of such production. The difference in price commanded by fractionated products over crude distillate from which they are separated, may comprise the governing factor in rendering some cycling projects economically feasible, and in all cases, extends the economic life of pressure-maintenance operations, therefore contributing largely to the conservation of an estimated 2 billion barrels of domestic condensate reserves.

The government action seeks to draw an arbitrary legal line through the processing operation in the Cotton Valley project. Separation of liquid from gas and stabilization of the distillate by removal and recovery of propane and butanes is not attacked. But the normal continuation of the process whereby motor fuel, kerosine, and fuel oil are fractionated from the remaining liquid, in the same cooperative plant, is alleged as illegal, and its prohibition is sought. In this respect Cotton Valley operations go further than most other cycling projects, but others are engaged in cooperative fractionation beyond the initial stabilization stage. Therefore, the Cotton Valley case is regarded as a test case which may largely determine the extent to which similar cycling and processing projects may continue in the future.

The remaining allegations in the

(Continued on page 191)

this week

"TIDELANDS"— Supreme Court hands down sweeping decision vesting title in offshore area beyond low-tide mark in the federal Government. . . . Opinion based on broad concept of national sovereignty and apparently applies with equal force to Gulf Coast. . . . Federal officials go into conference to decide on procedure regarding operators now holding leases from California. . . . Attorney General Clark asks that production be continued. . . . Texas officials, faced with possible loss of Continental Shelf royalty, promise further legal fight to retain title to its offshore areas. . . .

FPC— Last week's Supreme Court ruling upholding FPC authority in the Interstate case brings quick repercussions. . . . FPC Chairman Smith submits to Congress its own draft of legislation to exclude production and gathering from its jurisdiction. . . . Declares definition in FPC bill are less likely of confusion. . . . Three industry associations join in statement warning of gas shortages and higher prices to consumers as a result of conflicting federal-state authority and fear of producers of a public-utility classification. . . .

TREATY— Fight against approval of Anglo-American petroleum agreement continues. . . . H. J. Porter, spokesman for Texas independent group, tells Senate committee, the treaty threatens nationalization of the industry. . . . Counsel for Sinclair Oil declares reservations are meaningless and that State Department aims at international control of the industry regardless. . . .

EXPANSIONS— A.P.I. statement lists capital investments planned by petroleum industry through 1948 at $4,000,000,000. . . . Total is more than 22 per cent of the industry's total investment. . . . About half of sum will go into exploration and production, including land acquisitions. . . .

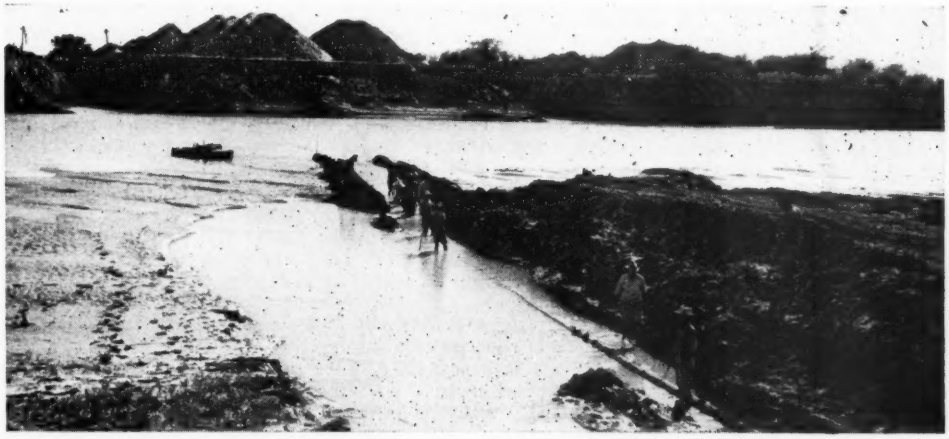
EXPLORATION— Sunray discovery in Santa Barbara County, California, flows 312 bbl. per day. . . . ¶Barnsdall extends Drinkard field, Lea County, New Mexico. . . . ¶Grapeland field, Houston County, Texas, gets new oil pay zone. . . . ¶Gas-condensate production found in Napoleonville Dome, Assumption Parish, Louisiana. . . . ¶Central Wyoming has prospective pool opener. . . . ¶McColl-Frontenac wildcat in Wetaskiwin area, about 25 miles southeast of new Leduc field, Canada, coring and testing oil show around 4,369 ft. . . .

ANTITRUST— Suit against Cotton Valley operators attracts wide interest. . . . Justice Department officials reiterate that case is directed at features of operation unique to Cotton Valley and which do not contribute to conservation. . . . Industry observers fear action will deter other similar unitized cycling operations. . . .

SUPPLY— Department of Commerce reinstates wartime export controls on petroleum products. . . . Action follows sharp criticism in Congress and elsewhere of Soviet Government tanker lifting on the West Coast. . . . Control resumption effective June 30, 24 hours before legal authority expires, and is apparently a move to force congressional action extending control law. . . . House merchant marine committee learns Soviet tankers were originally built for U. S. Government. . . . Further inquiry into how Russia obtained the vessels promised. . . .

INTERNATIONAL— Royal Dutch-Shell reports record 1946 crude production of approximately 630,000 bbl. daily in annual report. . . . ¶Capacity of Haifa refinery of Consolidated Refineries, Ltd., following pipe-line construction and plant expansion placed at 200,000 bbl. daily. . . . ¶Colombian minister rules concessions on Caribbean Coast will no longer require congressional approval. . . . Action expected to speed development. . . . ¶Official Romanian Government statement declares control of the oil industry is not contemplated in new industrial cartel measures.

PRODUCTION— Gain of 13,650 bbl. in Kansas crude production puts nation's output at new record of 5,123,000 bbl. according to compilation of The Oil and Gas Journal. . . . ¶Crude runs to stills up 16,000 bbl. to establish a new record at 5,164,000 bbl. daily., A.P.I. report shows. . . .



This is the Rio Grande River crossing of a new international natural-gas pipe line. Initial operation is set for early July. The 132-mile, 14-in. Mexican leg has been completed for Gas Industrial de Monterrey, S. A. At the border it joins the 17-mile 12¾-in. leg operated by Reynosa Pipe Line Co. from Weslaco gas field, Hidalgo County. An additional 14-mile section connecting to other Lower Valley production is under construction

Inflated Postwar Demand at Root Of Pipe-Supply Difficulties

by W. F. McConnor

Last week, in its June 21 issue, pages 57 and 58, The Oil and Gas Journal presented summaries of two industry conducted investigations into the current tight supply of several major types of oil-industry equipment. These reports were those of the materials committees of the National Petroleum Council and the Independent Petroleum Association of America.

This article presents the views of the manufacturer on the subject. It deals with the supply of tubular goods for which demand is extremely heavy. McConnor is vice president in charge of sales of National Tube Co., a U. S. Steel Corp. subsidiary. His discussion, here slightly abridged, was originally given as a part of the Steel Forum at the recent annual meeting of the National Association of Purchasing Agents in New York.

I WELCOME the opportunity of discussing with you today the subject of "Availability of Pipe and Tubing," and its relation to supply and demand, both at the present time and in the future.

This is particularly timely because of the many questions asked us in the pipe and tubing industry, among the most frequent being:

1. What is wrong with the tubular goods industry that it is shipping such a small amount of pipe and tubing?
2. Where is all the pipe and tubing going, and why isn't more available in the products in which we are interested?
3. What is the present over-all demand, and how much does it exceed the supply?
4. What are the short-range and long-range prospects for improvement in availability of pipe and tubing?
5. Is there any truth to the reports that large quantities of pipe and tubing are being sold in the black market, and likewise, that large quantities are being exported?

By discussing these questions openly, I believe we will have a better understanding of our mutual problems.

Pipe and Tubing Production

A review of the industry's actual production of pipe and tubing as taken from the published records of the American Iron and Steel Institute will give us the historical pattern of past demand upon which this industry must project its future policies and programs. All production figures are given in net tons:

Year	Output	Year	Output
1931	2,059,421	1939	3,764,272
1932	1,107,542	1940	4,272,684
1933	1,588,353	1941	5,736,906
1934	2,045,887	1942	5,283,844
1935	2,276,544	1943	6,219,345
1936	3,643,779	1944	6,406,423
1937	4,282,584	1945	6,030,243
1938	2,580,463	1946	4,689,932

The average of the 10 prewar years, 1931 to 1940, was 2,700,000 tons per year, and for the 4-year prewar period, 1937 to 1940, 3,700,000 tons. As pipe and tubing were very critical items for the war effort, production increased steadily during this period, reaching a peak of 6,400,000 tons in the last full war year of 1944. This figure dropped to 6,000,000 tons in 1945, due to reduced production in the reconversion period from V-J Day in August to the end of 1945. In 1946 the production of 4,700,000 tons was quite high, considering the interruptions due to the steel strike in January and February of that year, and the coal strike in April and May, coupled with curtailed production due to many shortages such as scrap, coal, coke, labor, freight cars, natural gas, fuel oil, etc. Preliminary data for the first quarter of 1947 indicate that industry production was approximately 18 per cent in excess of the average quarter for 1946. Thus, it might be estimated that with a continuing good product mix and no interruptions to production, a total of 5,500,000 tons could be attained for the year 1947. However, in view of the critical shortage of natural gas and fuel oil last winter, it appears that the industry will again experience shortages in this respect in the coming winter. Likewise some difficulty may be experienced in coal and other situations leading to some curtailment. In any event, it is expected that 1947 production will be in excess of 1946 production, which would make available a greater tonnage than ever before in a nonwar year.

The Distribution Pattern

In so far as product distribution within the pipe industry is concerned, the following breakdown for a typical 5,000,000-ton year would be expected from the historical pattern:

	Tons
Standard pipe	2,030,000
Oil-country goods	1,500,000
Line pipe	862,000
Tubing specialties (mechanical and pressure tubing)	485,000
Miscellaneous, all other	123,000
Total	5,000,000

Within a short time after V-J Day, August 1945, the collective demands for pipe and tubing were so greatly in excess of the available supply that some form of allocation or controlled distribution became necessary. Our procedure was to follow as nearly as possible the principles of the Controlled Materials Plan set up by the War Production Board during the war period. Briefly, the pattern was to take the ingot tonnage available for pipe and tubing production, and allocate this tonnage into standard pipe, oil-country goods, line pipe, and tubing specialties, in the same percentage proportions as obtained in a typical prewar period.

In any form of allocation it is impossible to take into account all of the many factors that might affect equitable distribution, such as population shifts, advances and retardents in certain industries, questions relating to the critical nature of certain products, etc. However, it must be recognized that any form of allotment, whether the basis may be to the advantage or disadvantage of a certain group or customer, is far superior and more equitable as a whole, than filling up order books on an unrestricted basis.

It must be kept in mind that allocations had to be tempered with the mills' ability to produce within certain size ranges, finishes, etc., and with their ability to handle and ship, physically, the allocated pattern under the usual conditions existing during the reconversion period.

Many persons inquire as to capacity figures for producing tubular goods. In general, capacity figures of finishing equipment cannot be accepted unqualifiedly but must be adjusted to the reality of controlling conditions. There has always been surplus finishing-mill capacity in the steel business, due to the flexibility required for various types of product mix in different periods. Obviously, at a time when industry is endeavoring to make full production, the ingots available for any particular product will limit the production possibilities of a finishing mill. Variations of product mix will make a considerable change in the capacity of a finishing unit. Soaking-pit capacity, bar and blooming-mill capacity—particularly for certain sizes of semifinished required—and many other variations and changes affect capacity figures. Some capacity reported includes marginal equipment involving high costs and obsolete and wornout equipment. However, the total capacity for pipe

and tubing, as published by the American Iron and Steel Institute, was 8,300,000 tons in 1944; 8,000,000 tons in April 1945; and 7,650,000 tons as of January 1, 1947. The decrease in capacity is due to obsolescence and dismantling of wornout, high-cost production units, primarily for the production of lapwelded pipe. Three major companies have dismantled all of their lapwelded equipment, and most of the remaining companies have curtailed or dismantled a portion of their lapweld capacity. In 1944, the percentage of production to capacity of finishing units for the industry, for all tubular products was 73.2 per cent; in 1945, 72.5 per cent; and in 1946, 61.3 per cent.

Estimates of Tubular Demand

The current demand for tubular products is difficult to estimate accurately in total, as pipe is primarily a service item. Requirements are intermittent and varied. Very little pipe is fabricated into consumer items. However, some estimates of the demand for certain classes of tubular goods can be made. For example, there has been a tremendous demand for large-diameter trunk lines. In February of this year we conducted a spot survey among the large oil and gas companies, covering pipe lines 20 in. o.d. and larger which they had on order or desired to install within the next 5 years. The aggregate of this tonnage represented over 1,000,000 tons a year, which is 20 times the volume of this size pipe purchased for trunk lines in the 5-year prewar period. There is, no doubt, some duplication of tonnage where competing companies desire to lay lines serving the same locality. But allowing for this and also for the fact that some of the projects are still in the preliminary stages, it is evident that the tonnage is beyond the ability of industry to produce in this period. This high ratio of demand to supply is significant for this commodity only, as the 20-in. and larger trunk line tonnage in the prewar period was only 2 per cent of the total pipe and tubing tonnage.

Let us examine the over-all trunkline demand, including all sizes of pipe, which represent about 10 per cent of the total prewar tubular tonnage. In the case of National Tube Co. the immediate postwar booking of firm orders in a period of less than 1½ years covered deliveries extending to 5 years.

The demand for refinery pipe and tubing for maintenance and new construction were checked in a brief survey, and the requirements were about seven times the actual prewar period purchases. However, this tonnage requirement is a very small percentage of the total tubular tonnage.

Referring to the demand for oil-country goods, it is significant that in the 4-year war period of 1942-1945, the average of 23,693 new wells was drilled per year, as contrasted with 30,221 new wells drilled in 1946, or an increase of 27 per cent. The average depth of well drilled in 1946 was 8 per cent deeper than in 1942. The drilling program projected for 1947 in number of wells and depth of wells shows a further increase over 1946. While the supply of oil-country goods does not equal the present demand, it is much more nearly in balance than the situation existing with respect to line pipe and refinery tubular goods. The high tonnage required in oil country goods has been accentuated by the nature of the demand. Casing of 80,000-lb. minimum yield, increased to approximately 26 per cent in 1945. This added burden has been largely due to increased well depths as indicated by the fact that in 1935 the first well was drilled to a depth greater than 12,000 ft., while in 1946 there were 106 such wells. In the 1942-45 period an average of 35 wells per year of 12,000 ft. or deeper were drilled as compared with three times this number in 1946.

In the case of standard pipe and miscellaneous line pipe, the market is so scattered and varied that it would be very difficult to conduct a survey of this demand. We do know that the average standard-pipe distributor, for his out-of-stock business, asks for more than twice his allocation. Stocks at the mills and in the hands of jobbers and distributors have been reduced to a minimum figure. It is significant that it would take 4 months with the present output of standard pipe to rebuild mill and jobbers' stocks to a prewar ratio commensurate with present production, if we did not ship a single foot of pipe in that period.

Drill-Pipe Situation Good

There are a few exceptions where the demand is declining, amounting to a small percentage of the total tonnage. For example, high-alloy tubing has been readily available at good deliveries for some time. The production of drill pipe is beginning to come closer to the demand, particularly in the case of A.P.I. drill pipe. There is a trend toward the lessening of the gap between demand and supply in the case of cold-formed mechanical tubing. This latter, however, is really only a trend, as comfortable backlogs still exist and deliveries are somewhat extended.

If the demand for other steel products declines before pipe and tubing, there is a possibility that this will release some additional semifinished steel that can be processed into pipe and tubing with industry's present capacity. This additional tonnage, however, would not be large.

It is recognized that the immediate postwar needs for tubular goods are abnormally inflated on account of the necessary restriction of this commodity during the war period.

Capacity Increase Questionable

It is questionable whether the sustained demand over a long postwar period would justify increased tubular capacity. The actual figures indicate that industry on a normal basis, with equipment in good shape, unhampered by strikes, shortages, etc., could produce about 5,500,000 tons per year with a good peacetime product mix. This is 48 per cent over the 1937-1940 average consumption.

The high costs of construction considered against the low profit position of pipe and tubing are not conducive to expediting further capacity increases. It should be understood that the equipment of the pipe and tubing industry has been driven to its utmost over a sustained period of 6 years with only emergency repairs, and practically no replacements.

It must be realized that new construction is hampered by many obstacles, including long deliveries in electrical equipment. Prolonged strikes in this industry, as well as volume demand, have contributed to this situation. Our program (an $85,000,000 rehabilitation and expansion), which we had hoped to carry out in 2 years, has been delayed by many shortages, strikes, etc., and we shall be most fortunate if the project can be completed by the end of 1948. I am not familiar, of course, with the detailed plans of other producers of pipe and tubing except to state that very little increased capacity has been definitely announced.

Black Market Insignificant

Several persons within the industry have investigated some of the many wild rumors regarding the large quantity of pipe and tubing sold in the black market and have come to the conclusion that the actual figure is a very insignificant percentage of the total tubular tonnage. When you consider that the bulk of our product is sold under allocation, our sales people have a close check in this tonnage and where it is going. To cite one case that occurred a few months ago, certain offers were broadcast to the trade offering buttweld pipe at $14 per ton over our carload consumers prices. As a test case, acceptances of these offers were made by a number of jobbers, and not a single order was actually taken.

In the case of export, the tonnage which the industry shipped in 1946 is the same as the prewar percentage bought in the free-prewar market. Actually the volume involved was less than 7 per cent, and in our case, over 90 per cent of this tonnage was shipped to American companies operating in South America and the Near East. Our export allocation for 1947 is on the same basis.

International

WORLD-WIDE OIL DEVELOPMENTS

200,000-Bbl. Daily Capacity Due For Haifa Refinery

SHORTLY after completion of the Kirkuk-Haifa 16-in. pipe line of Iraq Petroleum Co., Ltd., which will step up crude-oil deliveries to Haifa to 135,000 bbl. daily, it has been learned that all of this crude probably will be processed at Haifa by Consolidated Refineries, Ltd., which plans to construct facilities capable of handling in excess of 200,000 bbl. daily. At present Consolidated—jointly owned by Anglo-Iranian Oil Co., Ltd., and Anglo-Saxon Petroleum Co., Ltd. (Shell), two of the four principal owners of the Iraq company—is running around 90,000 bbl. daily.

Additional facilities at Consolidated's Haifa plant will be the erection of a lubricating-oil unit which will turn out about 5,000 bbl. of finished lubes daily.

152 Miles Welded

As of the end of May, 152 miles of the Kirkuk-Haifa 16-in. line, which parallels the existing 12-in. line, were welded. This is about 25 per cent of the line to be laid. Meanwhile, 195 miles of ditching has been completed, or about 31 per cent. A second pipeline gang is expected to start work on this line shortly, with their first job probably being the construction of river crossings. About 68 per cent of the 16-in. pipe for the Iraq Petroleum Co., Ltd.'s South line (the other being an identical 16-in. line from Kirkuk to Tripoli, Lebanon) has been rolled. Stewart and Lloyds of Great Britain are handling 75 per cent of the rolling with the remainder coming from the French mills at Anzin and Aulnoye.

January 1949 is the tentative date set for completion of the Kirkuk-Haifa line and January 1950 for completion of the Kirkuk-Tripoli line. When both lines are completed, the daily crude-oil capacity will approximate 275,000 bbl., against the current capacity of 90,000 bbl. daily. When and if the third pipe line from Kirkuk to the Mediterranean is completed, chances are that it will be a "big inch" job with daily capacity in excess of 300,000 bbl. daily.

New Degassing Station

Wells are now being drilled in Kirkuk for the fourth degassing station which itself is almost completed. Qutan will be the name of this station. The fifth and sixth crude-oil stabilizing units are about 50 per cent completed, and the erection of a power house is now under way. Eventually it is expected that a total of eight stabilization units will be built at Kirkuk. Daily capacity is approximately 50,000 bbl. Foster and Wheeler of London is handling the construction details.

Chile's Sixth Spring Hill Well Comes in a Producer

Chile's sixth well in Spring Hill field in Tierra del Fuego Archipelago has been reported as an oil producer by the Chilean Ministry of Economy. This well has accelerated plans for drilling of the seventh and eighth wells in the field which are scheduled for immediate spudding.

Corporation de Fomento de la Produccion (Chilean government oil corportion) has estimated, on the basis of this latest producer, that the Magallanes area will have a production of 1,600 bbl. per day.

Chile is negotiating in Great Britain for refinery equipment for a proposed 10,000-bbl. daily refinery in Punta Arenas or Valparaiso.

Ten Wells Scheduled for Qatar

AN initial daily output of from 20,000 to 25,000 bbl. daily of crude oil is expected sometime in 1950 from about 10 wells—all to be drilled between now and then — in Qatar's Dukhan field.

Qatar, a peninsula in the lower Persian Gulf area, has probable crude-oil reserves of approximately 1 billion barrels, according to the latest estimates of E. DeGolyer, international geologist. The operating company there is Petroleum Development (Qatar), Ltd., a company associated with Iraq Petroleum Co., Ltd.

Production in Dukhan field was brought in before and during the early stages of the late war with three wells having been completed. Tests on the first two wells showed a daily potential of approximately 5,000 bbl. each. All wells were so effectively plugged when it was feared the peninsula might be invaded by the Nazis that they probably could not be reconditioned. At any rate it is considered more advisable to drill new wells. Production in Dukhan field comes from a Mesozoic limestone formation.

The surface there shows a north-south anticline 4½ to 5 miles wide with an indicated length of 50 miles. The structural elevation of the discovery well (completed in 1940) was 300 ft.

Plans for the construction of a 60-mile 12-in. pipe line from Dukhan across the Qatar peninsula to Jebel Waqrah and a submarine terminal are now under way. Eventually jetties will be built.

Destination of this crude is not now definitely known, but there is more than a distinct possibility that some of it might be refined in the Netherlands East Indies—particularly in view of the fact that it will probably take years to recondition N.E.I. oil fields and drill new wells. To date, companies which operated in N.E.I. before the war have not been able even to inspect certain of their oil-producing properties.

Shell's World-Wide Crude Production At Record High in 1946

International
WORLD-WIDE OIL DEVELOPMENTS

WORLD-WIDE crude-oil production last year of the Royal Dutch-Shell group reached an alltime new high of 230,078,000 bbl. (approximately 630,000 bbl. daily) and exceeded 1945's output by 10 per cent.

This record production, the company's report said, "would be a source of great satisfaction, were it not tempered by the fact that the production of the (Shell) group in Romania, the Netherlands Indies, and British Borneo has decreased considerably since the outbreak of the war." It added that although the group's share in world production has increased over 1945, it is still below prewar percentage.

Venezuela was the greatest source of Shell's production, and in 1946 a total of 116,082,000 bbl. (approximately 318,000 bbl. daily) was produced, as compared with 95,976,000 bbl. (approximately 262,000 bbl. daily) in 1945. On December 31, 1946, production of or for the account of subsidiary companies in Venezuela amounted to about 357,450 bbl. daily.

Venezuela Exploration

The report said the refinery at Cardon in Northwest Venezuela is expected to be in partial operation next year. Exploration in Venezuela was pushed during 1946, it continued, and among the deep wells drilled was one east of La Rosa field which reached 15,106 ft., fourth deepest in the world and deepest outside the United States. Drilling last year in Mara field fully confirmed favorable indications at the time of the discovery of the field in 1945, the report added.

In Colombia, Shell's production in Casabe field amounted to 3,209,000 bbl. (approximately 8,700 bbl. daily), and by the end of the year a daily potential of 12,500 bbl. had been established. Shell secured a new concession in Colombia's Llanos, making the total concession areas held by Shell approximately 511,000 hectares, or 1,277,500 acres.

In Romania prospects for the resumption of operations on the prewar basis are "extremely gloomy." "The financial situation of the country is deteriorating day by day; no foreign exchange is available and the country is in a state of inflation," said the report. "The interests of Russia are the guide by which the economic policy of the country is determined. Our subsidiary company, the 'Astra Romana,' experiences the consequences of this in every sphere of its operations."

In the Netherlands, notwithstanding the shortage of drilling and other material, the quantity of crude oil produced increased considerably and amounted to upwards of 436,000 bbl., 17 producing wells having been completed during the year. The cracking plant at Pernis resumed operations and such progress in rehabilitating the tanks and the refinery had been made that the prewar throughputs of the cracking and distillation plants, of 2,000 tons (about 15,000 bbl.) per day each, were again reached. New chemical plants will be established at Pernis, including a plant for synthetic washing preparations, the manufacture of plastics is being taken in hand, and a plant for the production of polyvinyl chloride is to be built.

Middle East Operations

In the Middle East, where Shell interests hold a 23.75 share in Iraq Petroleum Co., Ltd., the new 16-in. pipe line to Haifa will be in operation in 1949, and the new line to Tripoli, the following year. The Haifa refinery capacity, the report said, will be increased from 30,000,000 bbl. to 60,000,000 to 65,000,000 bbl. a year.

Total tonnage of Shell's tanker fleet, one of the largest sailing under one house flag, passed the prewar figure early in 1947. At the end of 1946, the total was 1,487,000 tons deadweight. The company reported extensive plans for additions to the fleet with 16 vessels now on order or already under construction, but said even these will not be sufficient in the long run for that part of its trade which it plans to carry in its own vessels. To meet the needs, the company is purchasing a number of American T-2 tankers, it was pointed out.

Netherlands East Indies

In the Netherlands Indies the disturbance caused by the war again exercised an unfavorable influence on reconstruction plans, and in some areas no progress at all could be made. Tarakan production, however, by December 1946 had exceeded 130,000 bbl. per month, about one-third of the prewar production. At Balikpapan, the work of clearing, repairing, and reconstructing make steady progress, and the first distillation unit resumed operation June 24, 1946, followed on October 9 by a second. "The total processing capacity of these plants amounts to upwards of 36,000 metric tons (273,600 bbl.) per month, but owing to the inadequacy of auxiliary plants and a shortage of storage capacity, the average amount treated has hitherto remained below this figure," the report said. In the oil fields in the neighborhood of Balikpapan the repairing of damaged wells continued and at the end of November drilling of new wells was resumed.

At Pladjoe in the Netherlands Indies "a start was made in October 1946 with the rehabilitation of plants and storage depots. . . . On Feb. 1, 1947, a distillation unit was put into operation. The oil fields near Pladjoe remained inaccessible."

Total production of subsidiary companies in the Netherlands Indies in 1946 was 2,100,000 bbl. as compared with 110,000 bbl. in 1945.

In British Borneo part of the Lutong refinery was brought into use in December. Notwithstanding difficulties from the shortage of materials and trained personnel in restoring the Seria oil fields in Brunei and the Miri field in Sarawak, the target of potential production of 40,000 bbl. per day was reached by the end of 1946. Crude-oil production for the year amounted to 2,100,000 bbl. as compared with 74,000 bbl. in 1945. "Plans were finalized for the building of an up-to-date refinery on the island of Muara, situated in Brunei Bay, which will in due course replace the Lutong refinery. New exploration will shortly be undertaken in various parts of British Borneo."

European Activities

In France "the refinery at Pettit-Couronne was put into partial operation again for the processing of Venezuelan crude oil," the report continued. "The work of rehabilitation has proceeded far enough for the processing of Iraq crude oil to be resumed."

In Hungary "the petroleum industry is entirely under the supervision of the Hungarian Government, which in turn receives its instructions from Russian authorities."

Colombian Ruling to Aid Caribbean Development

By a decision of Colombia's minister of mines and petroleum, foreign oil companies seeking concessions on the Caribbean Coast of that country will no longer need congressional approval to explore and develop. This will probably result in saving of 2 to 3 years in obtaining final approval.

Previously Caribbean coastal areas were considered state reserves. This law still applies in so far as Pacific coastal areas are concerned. The following companies have applied for Caribbean coastal concessions: Socony-Vacuum, Shell, Sinclair, Texaco, and Richmond Petroleum Co.

U. S. Supply Prospects Improve; Rigid Contracts An Obstacle

by Henry D. Ralph

WASHINGTON.—Prospects that the Government will obtain sufficient supplies of petroleum products to meet its needs for the coming year are much improved as a result of a series of conferences between Government and industry officials conducted by the committee on military and government requirements of the National Petroleum Council.

The Government has altered some of its contract terms and procurement methods to conform to current industry conditions, and oil-industry executives have given assurance that government orders will be filled.

As a result of these conferences and the committee's report, released last week, government procurement officials have expressed confidence that all orders will be filled. The only apparent sour note was a press release issued by the Navy announcing that Naval aviation had been ordered curtailed because of shortage of aviation gasoline and implying that the oil industry had refused to make sales.

Last April government officials informed the NPC quarterly meeting that insufficient offers were being made for supply contracts, and as a result the council appointed a special committee headed by J. F. Drake, president, Gulf Oil Corp. This group met with procurement officials, analyzed requirement figures, received industry complaints about bid procedure, canvassed the entire situation, and made numerous suggestions which were accepted by the government men.

No Increase in Requirements

As a result, many misunderstandings have been cleared away. For one thing, it has been demonstrated that government requirements have not increased tremendously, as many in the industry believed. The fact is that government requirements are below last year's actual purchases for all products except aviation gasoline. Last year the Army and Navy bought very little aviation gasoline because they were drawing on their large stocks remaining after the end of the war; these are now virtually depleted and the services have been seeking bids for some months.

The requirements picture was somewhat confused because the Bureau of Federal Supply of the Treasury Department purchases petroleum products for all civilian agencies of the Government and for Army Ground Forces for use in the United States, while the Army-Navy Petroleum Board handles procurement for other military needs. Each agency has somewhat different procurement methods. Total requirements for the entire 1947-48 fiscal year have now been consolidated and broken down as to areas of procurement, and the Government has agreed to various alternative sources of supply.

Product specifications have also been relaxed somewhat. The services are willing to purchase 100/130-grade aviation gasoline containing 4 cc. of tetraethyl lead per gallon instead of 3 cc. as stated in the bid request, and perhaps other slight deviations from the official specifications. The committee also advised the Army to abandon the use of 80-octane all-purpose gasoline and use commercial grades of motor gasoline instead, pointing out that the relatively small quantitives of 80-octane desired makes the business unattractive to refiners and its distribution is an uneconomical use of transportation and storage facilities.

Difficulty With Bid Forms

Bid forms and procurement procedure, it was discovered, constituted one of the biggest obstacles in filling government requirements. The Bureau of Federal Supply pointed out that until February of this year it has never had any difficulty obtaining sufficient supplies under its regular procedure, and suggested that companies which held government contracts last year are morally bound to bid to retain that business. Other procurement officials, however, admitted that the present is a sellers' market and that sales are being made along the lines of least resistance, that is, to commercial accounts, because of the reluctance to enter government contracts since this builds up good will for future business whereas a government contract might be lost to a lower bidder next year.

One big problem is the lack of a specific "escalator clause" in government contracts which would permit an increased price if the market goes up. When OPA price ceilings were in effect government contracts permitted price increases if approved by OPA, but since then most contracts have been on a fixed-price basis. As a result, many suppliers were unable to raise their prices when the market advanced in recent months, and so have declined to bid on new contracts. In an attempt to meet this obstacle the Bureau of Federal Supply recently made contracts which allowed the delivery price to go up or down with commercial market quotations, but the General Accounting Office objected and the matter is still being argued within the Government.

Another Bid Provision

Another catch is the standard requirement that the bidder state that his price to the Government is no higher than to any commercial customer. The purpose of this is to prevent the practice, once common in some industries, of deliberately charging the Government more than the going market price. However, a number of oil companies are stuck with long-term contracts, such as to airports, at less than current market quotations, and are therefore unwilling to enter competitive bids on the standard forms.

During the war the BFS customarily made contracts under which the Government could demand delivery of 100 per cent above the contracted amount. This was done chiefly because the future demands of Army camps, hospitals, and other activities could not well be estimated far in advance. The need for this type of contract has passed, and BFS has now agreed to hold the supplier to no more than 25 per cent above the stated amount. This is said to be not far from commercial practice where contracts usually permit the purchaser to take 10 per cent more or less than the stipulated amount.

An over-all saving grace is that the statutes permit procurement officers to negotiate purchase if supplies cannot be obtained by standard competitive bidding. Thus if no bids are obtained for a long-term contract at a fixed price the Government can negotiate with individual suppliers on the basis of an escalator clause, or with government prices to go up or down with posted prices or otherwise recognized market quotations. This negotiation procedure, following failure of competitive bidding, can be used to set aside most of the troublesome features of standard government contracts, and permits procurement officers to conform rather closely to commercial practices in emergencies.

Negotiation a Last Resort

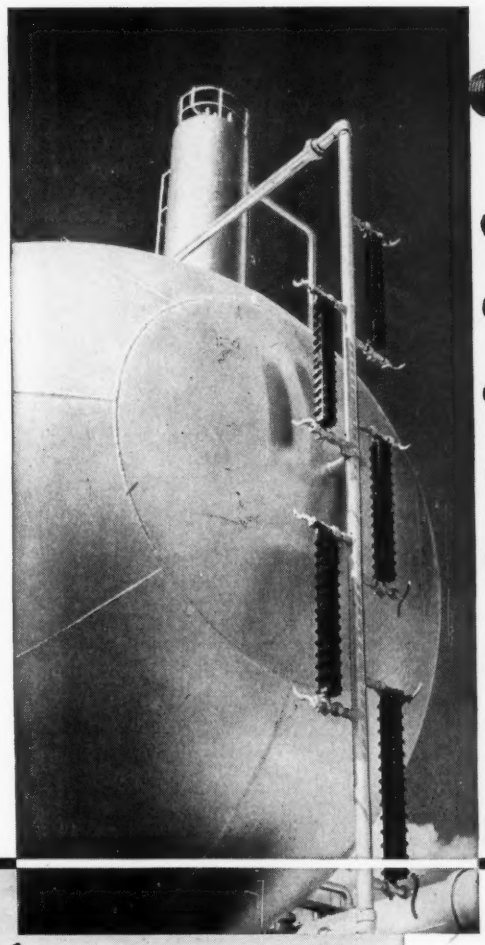
Some oil-industry men suggested that government bid forms ought to state that escalator clauses and similar provisions may be used. The procurement officials, however, feel that it is to the Government's interest to enter a fixed-price contract under the standard competitive-bidding practice if this is possible, and

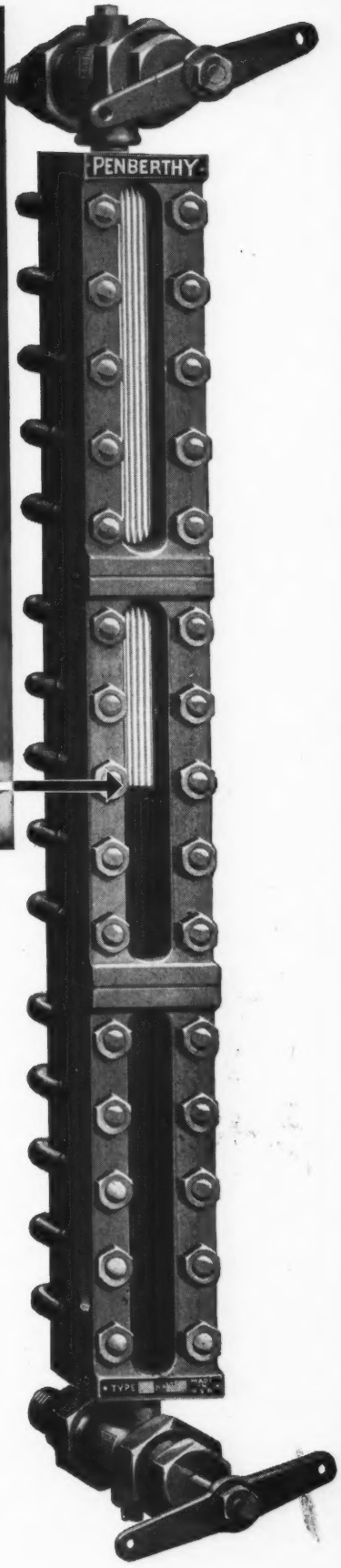
WHEN YOU MUST

BE SURE

OF THE

LIQUID LEVEL





Use

PENBERTHY "REFLEX" GAGES

DROP FORGED STEEL

There can be no error in reading the liquid level when you depend upon Penberthy "Reflex" Gages. The contrast between the black portion of the glass showing liquid and the white portion showing empty space is sharp and unmistakable.

Penberthy Drop Forged Steel Reflex Gages are available in whatever lengths required and for various liquids; they meet API—ASME requirements and are recommended for pressures up to 3000 psi at 100° F and 1000 psi at 1000° F.

PENBERTHY PRODUCTS

PENBERTHY INJECTOR COMPANY

Manufacturers of Quality Products Since 1886

DETROIT 2, MICH. • ***Canadian Plant—Windsor, Ont.***

2286

There is no Chemical Substitute for the
Nalco
WATER TREATMENT EXPERT
(One of the reasons why major manufacturers of chemicals depend upon Nalco for water treatment service.)
Not only the right water treatment chemicals—but knowing how to use them...Unless both of these vital elements are at work to keep your water treatment system functioning properly, the opportunities for trouble are excellent.
This is one reason the Nalco Water Treatment System is used so widely among manufacturers who are fully qualified by experience and ability to make their own water treatment chemicals. They know there is no chemical substitute for the Nalco field and laboratory experts who take full responsibility for water treatment results...and see that varying conditions are met promptly and effectively with Nalco chemicals and control methods.
A Nalco Survey costs you nothing—may be the means of saving you time, money, and worry. Write for complete information today.
NATIONAL ALUMINATE CORPORATION
6242 W. 66th Place, Chicago 38, Illinois
Canadian inquiries should be addressed to Aluminate Chemicals, Ltd., 555 Eastern Avenue, Toronto, Ontario
Nalco

that negotiation should be used only when other methods fail.

The Bureau of Federal Supply customarily purchases gasoline on 6-month contracts, and fuel oil on contracts ranging from 6 to 12 months. The Army and Navy in the past have purchased on a quarterly basis but are now shifting to a 12-month basis at the request of the industry in order to permit long-range planning.

At the conferences with the NPC committee, government officials asked for any other suggestions from the industry as to changes in government specifications, bid forms, and contract terms, offering to make any reasonable changes permitted by the statutes. However, no suggestions were offered other than those changes already adopted by the government agencies.

Allocation System Proposed

Government officials want the larger oil companies to work out a system of voluntary allocation of government orders so that each will meet a fair proportion of the Government's requirements. Such a proposal likely will be discussed at the July 10 meeting of the National Petroleum Council, but was not mentioned in the report of the Drake committee which simply urged all suppliers to bid on government business.

Fraser to Head Shell Union; Burns Takes Shell Oil Post

Alexander Fraser, president of Shell Oil Co., Inc., has been elected president and a director of Shell Union Oil Corp. effective July 1. He will succeed R. G. A. van der Woude, who is retiring after 40 years in the Shell organization.

H. S. M. Burns, senior vice president of Shell Oil Co., Inc., will succeed Fraser as president. Fraser has been president of Shell Oil since 1939; Burns, who joined the company more than 20 years ago as a geophysicist in California, returned to the United States in 1946 after several years abroad during which he directed Shell exploration and production in Colombia.

Shell Oil Co., Inc., is the wholly owned operating subsidiary of Shell Union Oil Corp.

Rizley Bill Substitute Submitted To Congress by FPC

WASHINGTON.—The Federal Power Commission has submitted to Congress a draft of legislation to exempt independent producers and gatherers of natural gas from its jurisdiction.

The bill is offered as a substitute for the Rizley and other bills now pending and to offset last week's Supreme Court decision in the Interstate Natural Gas Co. case. FPC said it still opposes action on other parts of Rizley bill until completion of its natural-gas investigation and that its draft on production and gathering is preferable to that of the Rizley bill because the definitions are sharper and less likely to result in confusion and controversy.

In transmitting the draft, Chairman Nelson Lee Smith recalled that in testifying before the House committee he said that if in the Interstate decision the Supreme Court should imply that FPC has jurisdiction over independent producers he could not reasonably object to clarifying legislation. He contended that the court did not necessarily give such jurisdiction but admitted that many people so interpret it. The proposed legislation, Smith said, is in accord with FPC's own rulings and interpretation of the intent of Congress.

The FPC bill would amend Section 1 (B) of the Natural Gas Act to read as follows:

"The provisions of this act shall apply to the transportation of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for resale for ultimate public consumption for domestic, commercial, industrial, or any other use, and to natural-gas companies engaged in such transportation or sale, but shall not apply to any other transportation or sale of natural gas or to the local distribution of natural gas, or to facilities used for such distribution; provided further, that the provisions of the act shall not apply to the production or gathering of natural gas by those engaged only in such activities and in selling such gas at arm's length prior to its transportation in interstate commerce, all as hereinafter defined."

It would also insert in the law the following definitions:

" 'Production' means the extraction of natural gas from reservoirs by means of wells, including any operations incident to production for the separation of casing-head gas from oil or of residue gas from other hydrocarbons, and the delivery of such natural or residue gas by the producer to one enaged in gathering or transportation within the meaning of this act. " 'Gathering means the collecting of natural gas from wells of the gatherer or other producers by its movement to central points through pipe lines and other facilities, including those for further processing and compression as a part of gathering, and only such incidental transportation by the gatherer as may be necessary for delivery of such gas into the transmission facilities used for the subsequent transportation of natural gas in interstate commerce within the meaning this act.

" 'Transportation of natural gas in interstate commerce within the meaning of this act' is limited to the movement of natural gas in interstate commerce through pipe lines and related facilities (including facilities for surface or underground storage as a part of transportation operations) after the completion of production or gathering as above defined, but before the beginning of local distribution."

The reaction of the industry to the Interstate decision was shown this week when three associations issued a joint statement warning of shortages and higher prices for gas consumers and urging support of the industry-endorsed amendments.

The Independent Natural Gas Association of America, the Independent Petroleum Association of America, and the Mid-Continent Oil and Gas Association said FPC's broadened regulatory authority will "virtually halt" the interstate flow of natural gas because of conflict in state and federal control and the necessity for well owners to qualify as public utilities *(Comments on the Interstate decision are found in Watching Washington, page 86).*

Thompson Predicts Crude Increase of 25 Cents

An increase of 25 cents per barrel in oil prices was predicted by Ernest O. Thompson, chairman of the Texas Railroad Commission June 18 at the annual meeting of the Panhandle Producers and Royalty Owners Association in Amarillo.

"The price of crude will have to go up again and again to pay for present deep drilling costs," Thompson predicted at the closing banquet of the meeting. "Premiums as high as 20 cents a barrel are rumored in East Texas today. I do not know this is a fact, but if they be true, no one should be surprised if the posted price should be raised 25 cents at any time."

New officers of the association chosen at the meeting are Cecil O'Brien, Amarillo, president; H. D. Thompson, Amarillo, first vice president; Jack Oats, Stinnett, second vice president; H. V. Wallace, Amarillo, secretary; and Lester Wiles, Borger, treasurer.

WASHINGTON WATCHING

BY HENRY D. RALPH

"Oil Shortage" Meeting

WASHINGTON.—The "oil shortage" hit the headlines last week when Secretary of the Interior J. A. Krug called a meeting of cabinet and other top government officials to talk over the situation.

Actually the meeting developed no information that was not already known to the industry and reached no conclusion except that petroleum supplies are going to be tight in the coming months and that everything possible should be done to help the industry with its production and distribution problems.

The chief reason for the meeting was that government agencies kept asking the Interior Department what the oil shortage talk was all about and why they were not getting many bids for their oil supply contracts. Krug decided the best way to handle the problem was to call the interested agencies together and give them an explanation all at once. Some 50 representatives of 17 federal agencies attended the 3-hour confab.

When it was over, Max Ball, director of the Oil and Gas Division, issued a statement explaining that demand is currently outstripping the capacity of the industry, particularly as to transportation, and that sufficient steel is not available for much immediate expansion.

Meeting Dramatizes Situation

But the meeting was big news, and served to dramatize, if not exaggerate, the situation. Rumors got about that wartime rationing of gasoline and fuel oil might be revived, or that government controls might be reinstituted over the oil industry.

Nothing of the kind was discussed, and Krug said that while supply and demand will be in precarious balance throughout the fall and winter there is no need for alarm or hysteria.

What the Government ought to do about it, the conference was told, is to give all possible assistance, short of new controls, to the oil and gas industries in obtaining more steel for drilling, pipe lines, tank cars, and other facilities. Also to put more pressure on a reluctant Congress to extend the authority of the Maritime Commission to operate government-owned tankers and to permit additional surplus tankers to be sold for foreign registry. The importance of preventing prolonged strikes, not only in the oil industry but also in the coal, steel, and transportation industries, was also stressed.

Widened FPC Jurisdiction

STUDY of the Supreme Court's decision in the Interstate Natural Gas Co. case is causing increasing apprehension on the part of natural gas attorneys and operators, and has redoubled the demand that Congress amend the gas act at this session.

The decision not only gives the Federal Power Commission more jurisdiction than it ever sought over the production and gathering of natural gas and its sale for transmission to other states, but some attorneys believe it requires FPC to reverse its actions in denying itself jurisdiction over various individual gas producers. The reasoning is that the high court said Congress intended FPC to regulate the price at which gas is sold into interstate commerce, and therefore the commission has no right to curtail itself as proposed in its recent administrative rule to exempt from regulation all producers and gatherers not affiliated with a trunk line and selling gas in an arm's length transaction.

"Mother Hubbard" Again

THE Department of Justice has again run away from a showdown on its 1940 "Mother Hubbard" antitrust suit against the American Petroleum Institute and all major oil companies, and the prospects that it will ever be brought to trial are even less than before.

The latest move was a government request that the federal District Court put over until its fall term the date for argument on the motion of Sun Oil Co. to force the department to answer a long set of interrogatories as to just how Sun committed the violations charged against all defendants. Sun wanted argument this month, but the department stalled on a date until the court approached the time for its restricted summer calendar.

By the time the fall term of court rolls around the chances are that the department will have filed one or two more antitrust suits making specific charges against smaller groups of oil companies so that it can save its face by dropping the A.P.I. case and explaining that the entire subject matter is covered by a series of more recent suits. For a long time it has been evident that the Justice Department wanted to drop the case but for political reasons it needed some good excuse.

Cotton Valley Complaint

FIRST reaction to the antitrust suit against the Cotton Valley Operators Committee was that the Department of Justice was laying the way to outlaw all unitized development, recycling, repressuring, and secondary-recovery projects.

Conceivably this might result, depending on the outcome of this case, but the Department of Justice insists that it has no such intent. Officials take pains to point out that the suit is directed only against features of the Cotton Valley operation which are unique and which, the department charges, are clearly illegal and have nothing to do with the technical aspects of pressure maintenance.

The Cotton Valley operation was approved by the Louisiana conservation commissioner under the state's law in 1940 and 1941, but only in so far as it provided for the unit operation and development and the reinjection into the reservoir under pressure of a part of the liquid and gaseous hydrocarbons produced. This part of the operation is not attacked in the antitrust suit. Strictly speaking, any unit operation is a technical violation of the antitrust laws, but so long as the courts continue to use the rule of reason in enforcement there is little danger that the ordinary unit operation will be attacked.

This suit is directed at practices which the department says are entirely unrelated to the recycling operation, are beyond the scope of the approval given by the state, and are not known to exist in any other cooperative development project. The chief complaint is against the requirement that all parties to the project must supply all their oil and gas to the refinery operated by the committee, and that the products of this refinery are sold through selected channels of distribution and at fixed prices.

The department charges that this agreement eliminates competition among the participants and deprives them of the opportunity of selling their own products. The suit is expressly directed against the practices of the Cotton Valley Operators Committee which do not contribute to conservation and are not covered by the state permit.

Present Prices Generally Adequate, Holman Tells Bradford Group

SPEAKING June 19 before the Bradford District Pennsylvania Oil Producers Association, Eugene Holman, president of Standard Oil Co. (N. J.), stated that while the record demand for petroleum products develops a strong urge to build up prices in the competition for tight supplies, the present crude-oil prices under today's conditions are adequate in a majority of cases.

Holman declared that it is difficult to see any benefits to the public, in either greater supplies or better products, from further increases in crude-oil prices at this time. Emphasizing the industry's responsibilities to the public, he said, "The principal problem of our industry today is not that of prices but of providing the maximum possible quantities of oil products to meet the public's pressing and growing demand.

"This is a time to remember that, over the long pull, the lower the prices of oil products, the more are the people who can enjoy their benefits. This is a time for investment in the future. We have an obligation to help stabilize an economy of which we are an important part. This dictates policies based not on short-term expediency but upon the long-term best interests of the industry as a whole."

Predicting that supplies of both crude oil and products will remain tight, but not critically so, for at least 12 to 18 months, the Jersey company head attributed this not to a shortage of crude-oil reserves but to the fact that the industry has been unable to drill the number of new wells, provide the transportation, and build the new facilities necessary rapidly enough to produce and handle present record demands for oil.

Also, he added, during the war the oil industry concentrated on maintaining production with the minimum expenditure of manpower and material and building special units for war use.

Industry Facing Competition

On the subject of synthetic-oil products, Holman said the cost of making such products from coal may not be much higher than the cost of making these products from oil. The synthesis of oil products from gas, he added, already appears competitive with petroleum in some cases, but he reminded his audience that capital investments for deriving liquid fuels from natural gas or from coal are very large. "All of this," he said, "means that the oil producer is facing real competition from sources that have not been too seriously considered in the past. . . ."

Holman also discussed foreign oil and the relationship between major oil companies and the small or independent operators. He forcefully stated that the domestic oil industry should have the first opportunity to supply the petroleum needs of the United States at fair prices.

With regards to relationships between large and small operators, Holman said: "The distorted picture of big versus little business, in which an effort is made to portray an opposition of interest between large and small enterprises, is basically false. We are not on opposite ends of a seesaw so that when one goes up, the other must go down. We are in the same boat. We will float or sink together. Without each other, big business and little business would both go out of business."

Discussing foreign oil reserves, Holman said products from these sources are not pressing for a market in the United States. Demand for oil abroad is rising rapidly, he said, and has a potential rate of increase far greater than our own.

Holman was introduced to the Bradford group by Ralph T. Zook, president, Sloan & Zook Co., at the annual dinner of the association. C. M. Oliver presided over the dinner and also the business session which preceded the dinner. The association adopted resolutions in memory of Earl C. Emery, John Messer, J. L. Yerdon, and R. S. Pringle, Sr., directors and members of the group who died during the past year. Three new directors were elected: William Davis, Olean, N. Y.; and James Bird and S. M. Gregg, Jr., both of Bradford.

Allocation Plan Announced By Indiana Standard

Declaring its facilities are operating at full capacity but that demand is running about 15 per cent above last year, Standard Oil Co. (Ind.) June 24 announced it is limiting June, July, and August gasoline deliveries.

The company said its agents and dealers would receive approximately the same quantities as in the corresponding period of 1946 and that how they allocated available amounts to their customers would be left to them to determine.

Socony-Vacuum Rates First

Socony-Vacuum Oil Co., Inc., ranked first in accident prevention in 1946 among 220 companies surveyed by the American Petroleum Institute.

Employes of Socony-Vacuum worked more than 42,000,000 hours during the year with only 260 injuries and one death for a frequency rate of 6.14 disabling injuries for every 1,000,000 hours worked. This compared with an industry average of 13.61. The next three ranking companies in accident prevention and their frequency rate were: Continental Oil Co., 10.16; Standard Oil Co. of Texas, 10.47; and Globe Oil & Refining Co., 11.6.

Explosion Damages Los Angeles Harbor

LOS ANGELES.—Explosion of the 113,000-bbl. tanker Markay in Los Angeles Harbor on June 22 has resulted in that harbor's worst explosion and fire disaster.

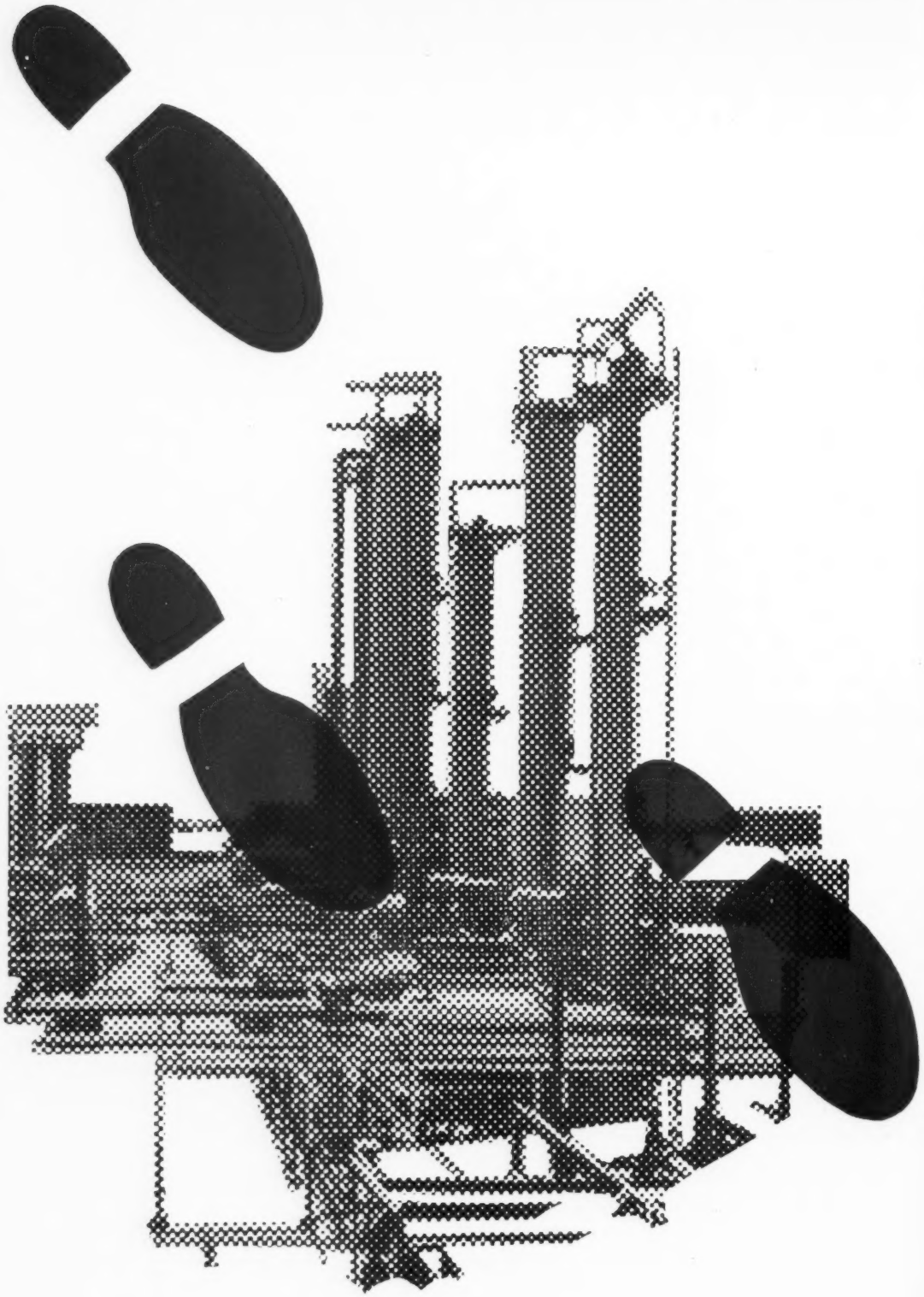
Losses currently are estimated at between 5 and 10 million, and at least two persons are known to have lost their lives. Twelve crew members and dock workers are still missing and presumed to be dead, while hospitals have reported 22 persons being treated for injuries.

The Markay, largest tanker in service on the West Coast, was owned by Pennsylvania Transportation Co. and was operated by Keystone Shipping Co. It has been used by Shell Oil Co., Inc., for the past 5 years.

Bound for Martinez, Calif., and loading at the Shell docks, Piers 167 and 168, the tanker had taken aboard 70,000 bbl., consisting primarily of automotive gasoline with some diesel and stove oil, at the time of the disaster. Both Piers 167 and 168 and all lines and valves leading from storage tanks were destroyed.

Fortunately the force of the explosion was expended over the water, thus sparing 20 Shell storage tanks which contained 325,000 bbl. of gasoline, diesel, and other oils. Fire resulting from the explosion threatened the storage tanks but was brought under control before other than superficial damage occurred. Burning gasoline and diesel oil spread across the channel to the American President Line dock, and destroyed three piers and seriously damaged a fourth before flames could be controlled.

Some cargo in storage at the American dock was destroyed. Investigations to determine the cause of the explosion have been started, but smoldering wreckage has hindered investigators and definite cause will not be known for some time.



KEEPING A STEP AHEAD

"Follow the leader" is no game for the refiner who plans for the future. Continued successful operation in the face of competition demands that he keep a step ahead.

Enabling licensee refiners to maintain efficient, economical production is the primary purpose of the Universal organization.

A constant search for new methods and for improvement in present methods means that each Universal licensee is always a step ahead with the latest in processes and operating technique.

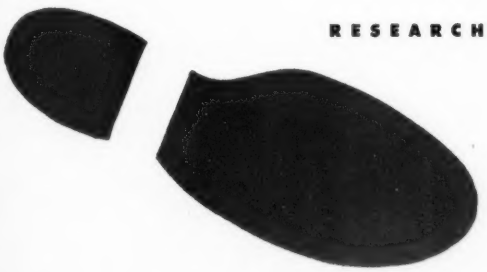
In planning your next step, remember . . . UOP facilities and service are always available to help you derive the greatest possible benefit from your operations.

UNIVERSAL OIL PRODUCTS COMPANY

General Offices: 310 S. MICHIGAN AVE. UOP CHICAGO 4, ILLINOIS, U. S. A.

LABORATORIES: RIVERSIDE, ILLINOIS

RESEARCH · ENGINEERING · PROCESSES · SERVICE



Refinery equipment of every description being offered for sale in units or single pieces. This is the outstanding buying opportunity of the year! No waiting or promise of later delivery. All material offered for sale for *immediate delivery*. First come—first served! Don't wait! Get in touch with us now.

- **PUMPS OF EVERY KIND**
- **COMPRESSORS**
- **FITTINGS**
- **CAST IRON AND STEEL PIPE**
- **HEAT EXCHANGERS**
- **HEATER FURNACES**
- **FRACTIONATING TOWERS**
- **STEEL BUILDINGS**
- **STORAGE TANKS**
- **VATS**
- **DRUMS**
- **COOLING TOWERS**

Many other Items too numerous to Mention

Our engineer and representative at the plant site daily to show you around. Inspection of equipment can be made at any time. We strongly recommend that you send your engineer or representative to inspect this plant and fill your requirements instead of waiting indefinitely.

WRITE WIRE or PHONE

SAMPSON MACHINERY & SUPPLY COMPANY

INGLESIDE, TEXAS

Telephone No. 6 **(Near Corpus Christi)** **P. O. Box 995**

FRED GREENBERG, RESIDENT MANAGER

Texas Independents, Sinclair Group Present Case Against Treaty

WASHINGTON. — Further opposition to ratification of the Anglo-American petroleum treaty was given the Senate foreign relations committee June 23 by two spokesmen for Texas independents and two representatives of Sinclair Oil Corp.

Elmer Patman, attorney for Superior Oil Co., Houston, opposed the treaty on the grounds that it would give the federal Government power over oil production now reserved to the states by the Constitution and recognized by actions of Congress, and it would open the way to apportion the United States market for petroleum products among world producers on the basis of recoverable reserves and thus destroy the market-demand statute of Texas. As to the A.P.I. and Vandenbero reservations, Patman said they are an admission that the treaty does not protect the domestic industry and constitute a negative approach. Observing that Congress has latent powers over commerce which it has not yet used as to oil production, Vandenberg observed that the witness was in a fix since he feared what Congress might do with or without a treaty, but Patman replied a treaty is an effective amendment to the Constitution regardless of its wording and could be used to induce Congress to enlarge federal jurisdiction.

Nationalization Feared

H. J. Porter, president of Texas Independent Producers and Royalty Owners Association, asserted the treaty will substitute nationalization of the industry for private enterprise, and that it is supported by the State and Interior departments for the sole purpose of obtaining federal control over oil production and by large oil companies in the hope of escaping antitrust laws in their foreign operations. He said the attitude of State Department officials shows they do not take seriously the reservations of the American Petroleum Institute or the amendments proposed by Chairman Vandenberg, and that the proposed International Petroleum Commission would be dominated by companies operating abroad and its advice would have the effect of orders.

P. C. Spencer, Sinclair general counsel, said the treaty is against the best interests of United States oil operators both here and abroad, adding that the proposed reservations only add to the confusion and that the State Department appears to be determined on international regulation of the oil industry regardless of any reservations.

Fraser Is Special Counsel

Henry S. Fraser, Syracuse, N. Y., attorney and formerly counsel of the O'Mahoney Senate petroleum committee, appeared as special counsel for Sinclair and presented a lengthy brief on points of international law disputing State Department contentions as to the effect of the treaty and of reservations. When the committee recessed,

Fraser declared the negotiators had been out-traded because the British excluded from the treaty rich potential oil areas such as Kuwait, Bahrein, Qatar, and others. He challenged the contention that reservations and interpretations would be binding and charged Charles Fahy, State Department counsel, with giving erroneous information and inaccurate quotations from authorities when he told the committee earlier that statements of the negotiators as to the effect of the treaty would be binding on its administration.

The committee also received a brief prepared for Sinclair by Arthur A. Ballantine, former undersecretary of the treasury, declaring that the treaty would place the United States petroleum industry into an intergovernmental cartel, would lodge in the federal Government unlimited jurisdiction over the entire petroleum industry with a duty to exercise it to carry out the purposes of the treaty, proposed reservations would not be effective in eliminating the difficulties with the treaty, and the provisions are such as to create uncertainty.

Hallanan and Holman To Address Marketers

Walter S. Hallanan, president of Plymouth Oil Co., and Eugene Holman, president of Standard Oil Co. (N. J.), will be opening day speakers at the 2-day midseason meeting of the Marketing Division of the American Petroleum Institute, June 30-July 1 at the Nicollet Hotel, Minneapolis.

Hallanan will speak on "Is the Petroleum Industry Facing a Challenge Now?" and Holman will continue this theme with "What Is the Petroleum Industry Doing to Meet This Challenge?" The program committee headed by P. E. Lakin, Shell Oil Co., Inc., New York, has extended invitations to the officers and members of all petroleum marketing associations to attend the meeting.

Arguments Heard in Seeligson Case

THE Seeligson field case, involving some 615 South Texas wells ordered shut in by the Texas Railroad Commission for alleged waste of gas by flaring, was argued before the Texas Supreme Court June 18 in Austin. A decision from the court is now awaited.

Following a hearing on gas waste in the field, the Railroad Commission March 17, issued a special order effective April 1 shutting in wells whose gas was being currently flared. Operators in the field, led by Shell Oil Co., Inc., Sun Oil Co., and Magnolia Petroleum Co., obtained a District Court restraining order against enforcement. The injunction was issued on the basis of the claim that the commission lacked authority to close the field's wells and that a $10,000,000 gasoline plant to utilize the gas would be in operation on or about January 1. The state then appealed the District Court's decision.

Texas' Atty. Gen. Price Daniel declared it is the state's right to control its natural resources and that if there is a failure to exercise that right, oil companies are inviting federal control of the industry.

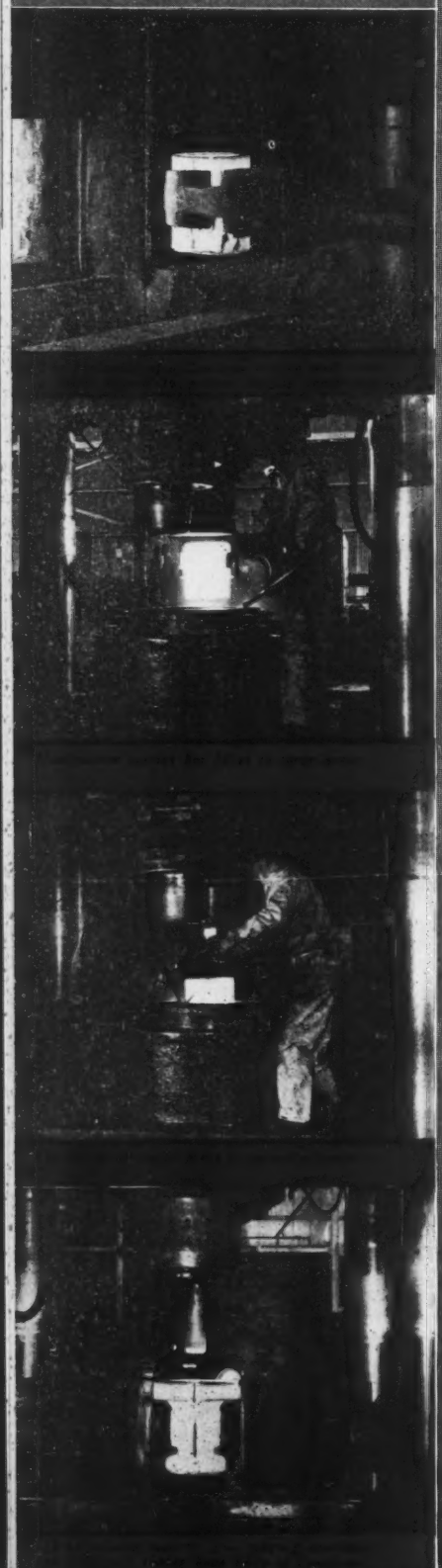
Former Gov. Dan Moody and J. A. Rauhut of Austin, representing operators, presented evidence showing the necessity of producing certain quantities of gas with oil. They held the commission order discriminated between properties in Seeligson by permitting oil production from wells whose gas is used for drilling operations, and contended such action was arbitrary, since a projected gasoline plant has been delayed by lack of materials.

The State's Position

The state holds that Seeligson operators have had more than a year to install a plant for utilizing waste gas. It was pointed out that operators in other fields have installed similar plants since Seeligson operators were notified to do likewise. The state also contended that Seeligson gas could have been delivered to the Alice cycling plant, 20 miles distant.

Outcome of this case is of broad importance to Texas. If the Supreme Court decides the Railroad Commission has power to close oil wells until operators arrange to use flared casing-head gas, other fields in the state may also be shut in.

"HOW CAMERON FORGES A FLANGED TUBING HEAD"



MASS PRODUCTION *Economy*

is yours in these new CAMERON FORGED well heads

1 Interchangeable tubing hangers to meet operator's specific needs.

2 Time-proven lock screw design.

3 Forged alloy steel head . . . a homogeneous, leak-proof product.

4 Seal flanges, with or without test port, easy to install.

5 Improved forged steel slips in 6 segments . . . contained in two-piece cage for easy assembly around pipe.

6 All chance of failure due to physical defects in steel eliminated by Cameron forging process.

In these new *forged steel* casing heads and tubing heads, embodying several innovations in design, Cameron brings to the industry a new high standard of quality at a new low price made possible by mass production methods. Available in 4000, 6000 and 10,000 lbs. test, these new Cameron Forged Well Heads are offered at a substantial saving. A bulletin descriptive of Cameron Forged Well Heads and Cameron Forged Flow Wings will gladly be sent to operators responsible for the selection of completion equipment.

CAMERON IRON WORKS, INC.

P. O. BOX 1212, HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. West Texas: Odessa, Telephone (1710). California: 1442 Hayes Ave., Long Beach (7-2036). Oklahoma: 310 Thompson Bldg., Tulsa. Wyoming: 356 N. Wolcott St., Casper. North Louisiana: Bossier City (P. O. Box 425).

PERSONALS

Reed Appointed Head Of East Chicago Refinery

WILLIAM W. REED, who started with the Socony-Vacuum Oil Co., Inc., in 1922 as a chemist in the marketing department at Milwaukee, Wis., has been appointed superintendent of the Socony-Vacuum refinery at East Chicago, Ind.

Reed succeeds William Hildebrandt, who retired under the Socony-Vacuum pension plan and who, during World War 2, was Indiana state chairman for the Committee on Protection of Petroleum Facilities, Great Lakes region. He became superintendent of the East Chicago refinery in 1926.

Four years after his first position in Milwaukee, Reed was transferred to the 34,500-bbl. daily capacity East Chicago refinery. He became assistant superintendent in 1932. He attended the University of Wisconsin and University of Indiana and is a native of Milwaukee.

Dr. Claude E. ZoBell, director of the American Petroleum Institute research project on the role of bacteria in oil origin and accumulation, and professor of microbiology at the Scripps Institution of Oceanography, has received a grant from the Rockefeller Foundation for a year of travel and study in European laboratories. He will continue his studies on the origin of oil, with particular reference to the effect of pressure on the transfer of hydrogen and the liberation of oil from sediments. Invitations have been received from several research institutions in Europe. After discharging his responsibilities as vice president of the Fourth International Congress for Microbiology, ZoBell will visit various marine stations on the Continent, it has been announced.

Richard C. Sauer has been elected vice president of Standard Oil Co. (Ohio) in charge of the supply and distribution department. Sauer, who joined Sohio in the traffic department in 1922, later became assistant in the refined-products distribution department. In January 1946 he was elected vice president of Sohio Petroleum Co., and was made manager of crude-oil and products supply and distribution.

Robert H. Woodstone and **E. D. H. Friend** have joined Bay Petroleum Co. Woodstone will be assistant to **Warren Beebe,** chief geologist, and Friend, Rocky Mountain geologist under **Dr. J. H. Maxson. Dan Roberts,** Bay geologist, has resigned to return to the Army Air Forces.

Morgan Walker, vice president and general manager of the Bechtel-McCone Co. of Venezuela, is en route to Palestine where he will supervise pipe-line construction work.

G. A. Ibach has been named superintendent of the Sweeney, Tex., refinery which Alamo Refining Co. recently purchased from WAA. Phillips Petroleum Co. owns a majority interest in Alamo, and Ibach was formerly superintendent of Phillips' Okmulgee refinery. **A. B. Leonard,** of Phillips' Kansas City refinery, will be assistant superintendent.

R. F. Baity, assistant general manager of sales, Standard Oil Co. (Ind.), has been elected a director following the retirement of **L. C. Welch,** general manager of the lubricating and sales technical-service departments. **Dwight F. Benton** succeeds Welch as head of those departments.

Robert L. Keyes, division manager, production department, The Texas Co., has been elected president of the newly formed Petroleum Club of New Orleans. Other officers are: **Harold C. Teasdel,** vice president of California Co., vice president; **Harry Fotiades,** independent producer, treasurer; and **Dr. Gordon Atwater,** consulting geologist, secretary. Members of the board of directors of the new club include the officers and the following: **R. L. Humphrey,** Oil Well Supply Co.; **Kenneth Crandall,** president, California Co.; **H. Grady Meador,** division manager, Gulf Refining Co.; **Earl G. Bateman,** Bateman Oil Co.; **William Helis, Jr.,** independent oil operator; **E. D. Wingfield,** manager. Freeport Sulphur Co.; **John Bricker,** division land manager, Humble Oil & Refining Co.; **William Johnson,** New Orleans area land manager, Shell Oil Co., Inc., and **Reese Carter,** independent oil producer and operator.

Walter Clingo, chief clerk, Montana division, Texas Pipe Line Co., Cut Bank, has been appointed division superintendent replacing **Ed Johnson,** who has been transferred to Venezuela.

J. G. Schaafsma has been named assistant to the manager of laboratories department of General Petro-

J. G. SCHAAFSMA

BERT FOLDA, JR.

leum Corp., and the laboratories' process and economics sections will be under his guidance. **Bert Folda, Jr.,** also has been promoted to a position bearing the same title and will supervise the chemical and lubricants section as well as the Vernon control laboratory. Schaafsma has been with General Petroleum since 1934, and formerly was supervisor of the process section at Vernon. Folda also joined the company in 1934. He has been supervisor of the chemical lubricants section.

Oliver S. Hagerman has been named president and general manager of United Fuel Gas Co. and affiliated companies succeeding **Harry A. Wallace, Jr.,** who has resigned.

Paul V. Keyser has been appointed manager, lubricating-oil department, Socony-Vacuum Oil Co., Inc., succeeding **H. S. Merriman** who becomes a member of the national accounts department. Keyser is at present director of the company's research and development laboratories, Paulsboro, N. J. His successor will be **Thomas P. Simpson,** now assistant director. Keyser is a Massachusetts Institute of Technology graduate, and Simpson is an alumnus of California Institute of Technology.

John J. Kennedy, Jr., has been appointed coordinator of operating standards at the Bayway (N. J.) re-

PERSONALS

finery of Standard Oil Co. of New Jersey. **Neil Murphy** has been assigned to direct distillation, cracking, heat exchange, and combustion control, and **Paul F. Hawkins** has been transferred from the operations-analysis department to the office of the process coordinator.

C. B. Roach, chief development engineer for Cia. de Petroleo Shell de Colombia, is on vacation in England and later will go to The Hague. **J. van der Lely** is temporarily taking over Roach's duties.

J. W. Leonard has been elected chairman of the board, Leonard Refineries, Inc., Alma, Mich. Other company officers selected at the June 17 annual meeting, are: **Reid Brazell,** president and general manager; **L. R. Kamperman,** vice president and general sales manager; **John S. Pfarr,** vice president in charge of manufacturing; **R. L. Anthony,** secretary; and **Reid Brazell,** treasurer.

Morris P. Carpenter, executive director, Whiting laboratories, Standard Oil Co. (Ind.), has been appointed to a scientific personnel committee to advise the U. S. Atomic Energy Commission.

Sherman A. Wengerd, geologist, Shell Oil Co., Inc., Wichita Falls, Tex., has been awarded a Ph.D. degree by Harvard University. His thesis was "Lithologic Variation of the Viola Limestone in South Central Oklahoma."

A Walter Elliott Memorial Fund, honoring the late Walter Elliot, who was general drilling superintendent of Shell Oil Co., Inc., at the time of his death February 7, has been established at Stanford University. **Dr. Donald B. Tresidder,** Stanford president, said the fund was set up by friends with an initial gift of $2,600, and that the income will be used to further work of the school of engineering. **Fremont R. Schmieder,** Ventura, Calif., is secretary-treasurer of the fund committee. Elliot, with Shell 30 years, was a 1911 civil engineering graduate of Stanford.

D. J. Pickerell is now a partner in Golden Gate Petroleum Co., San Francisco. He served with the Navy during the war and was a geologist for Honolulu Oil Corp. prior to that time.

F. T. Plaza, special representative of Richmond Petroleum Co. de Colombia, recently returned from an extended trip to Peru, Chile, Argentina and Brazil where he studied oil operations in those countries.

John Biegel has joined Tarr & McComb Oil Co., Los Angeles, from Union Oil Co. where he was a process engineer.

Frank Lovering has been made Rocky Mountain division production superintendent by Phillips Petroleum Co. Lovering was transferred to Denver from Hobbs, N. M.

Kenneth D. Vandervort, chief accountant, Amerada Petroleum Corp., has been elected president of the Los Angeles Petroleum Accountants Society. Other new officers are: First vice president, **John F. Baumgaertner,** Ohio Oil Co.; second vice president, **E. C. Rogers,** Union Oil Co.; and secretary - treasurer, **Harold D. Osborn,** General Petroleum Corp. New directors are: **J. R. Brown,** Standard Oil Co. of California; **E. B. Downey,** Richfield Oil Corp. and **F. S. R. Sedding,** Doheny-Battson interests.

Claude Swift is the new manager of research of Union Oil Co., succeeding **Don Carr,** who has resigned.

John T. Ashford, vice president, Associated Contractors & Engineers, Houston, has been transferred to Midland, Tex., to head the company's West Texas offices there.

W. S. Crake, chief mechanical engineer, Shell Oil Co., Inc., Houston area, will leave on a business and pleasure trip to England June 23. He will return to Houston September 1.

At the monthly meeting of the Los Angeles Nomads, June 11, guests from outside the United States included the groups shown here. Above, standing, are: H. E. Keck, Iraq Petroleum Co., Ltd.; G. F. Harvey, International Petroleum Co., Peru; R. A. Davis, Iraq Petroleum Co., Ltd.; R. J. Bowman, Standard Oil Co. of California; Q. D. Turner, Mene Grande Oil Co., Venezuela; K. R. Jauman, Iraq Petroleum Co., Ltd.; J. R. Dunn, Columbia Petroleum Co.; C. R. Devine, Drilling & Exploration Co., and T. C. Oakes, Iraq Petroleum Co., Ltd. Seated, are: A. Norcott, International Petroleum Co., Peru; C. T. O'Connor, Trinidad; and Don Rowe, B. F. Weaver, and D. C. Mong, all of Servicio Thomas, Venezuela. Below, standing, are: Juan P. X. Pedretti, Union Oil Co., Paraguay; H. D. Huskey, Iraq Petroleum Co., Ltd. Henri C. Piek, Standard-Vacuum Oil Co., Netherlands East Indies; and Harold D. Divenish, Trinidad Oil Field Service, Ltd. Seated: John L. Everitt, Mene Grande Oil Co., and L. F. Ramirez, Arabian American Oil Co.

H. H. Hall, formerly chief engineer for Standard Oil Co. of California, has been made a director and vice president of Trans-Arabian Pipe Line Co. Hall will devote his time to planning and construction of the projected 1,050-mile Arabian crude-oil line. As a result of the change, he has been given the title of consulting engineer for Standard of California.

F. J. COLTON

Frank J. Colton, superintendent of gas operation, Tide Water Associated Oil Co., has been chosen president of the California Natural Gasoline Association for 1947-48. Colton has been active in the affairs of the association since 1935. **W. A. Kirk,** California Southern Oil Co., was elected vice president and will head the advisory committee. New directors elected for 2 years follow: **A. H. Bradford,** West Coast Refining Co.; **John G. Braun,** Braun Corp.; **Earl Dunn,** The Fluor Corp., Ltd.; **R. C. Enderly,** Wilmington Gasoline Co.; **M. L. Fort,** Pacific Lighting Corp.; **C. D. Gard,** Union Oil Co.; **R. D. Gibbs,** Union Oil Co.; **R. W. Heath,** Signal Oil & Gas Co.; **J. C. Herron,** Shell Oil Co.; **H. R. Linhoff,** Richfield Oil Corp.; **S. F. Magor,** Superior Oil Co.; **P. S. Magruder,** General Petroleum Corp.; **H. W. Parmelee,** Del Valle Gasoline Co.; **W. W. Robinson, Jr.,** The Texas Co.; **W. D. Smith,** Wilshire Oil Co.; **R. S. Tulin,** Shell Oil Co., Inc.; **E. W. Walker,** Western Gulf Oil Co.; **E. W. Webb,** Continental Oil Co.; and Colton.

E. H. Timmerman, senior exploitation engineer, production department, Shell Oil Co., Inc., has been transferred from Lake Charles to Houston. Other transfers and promotions in the exploration and production departments of Shell in Texas and the Gulf Coast areas include: **A. D. Arnold,** clerk to senior clerk, production, Kilgore; **W. Baillie,** exploration, Shell Oil of Canada, to assistant seismologist, New Orleans area; **T. W. Barron,** junior mechanical engineer, Wasson gas plant, Denver City, to Magnolia gas plant, Magnolia; **R. B. Cravens,** roustabout to head roustabout, production, McCamey; **J. F. Dillard,** junior mechanical engineer, production, White Castle to Houma; **W. A. Gautreaux,** roustabout, Freer, to engineer assistant, Premont; **R. M. Hippard,** junior exploitation engineer to exploitation engineer, production, Odessa; **S. James,** gang pusher to head roustabout, production, Monroe; **F. D. Leigh,** junior mechanical engineer, production, Houma to Lake Charles; **D. A. Nicewander,** junior mechanical engineer, gas - gasoline, Sheridan cycling plant, to Wasson gas plant, Denver City; **C. L. Pearson,** junior stratigrapher to stratigrapher, exploration, Midland; and **R. E. L. Taylor,** senior draftsman to chief draftsman, production, Midland.

George M. Straughan has resigned as geologist for Magnolia Petroleum Co. at Abilene, Tex., and has bought an interest in J. E. Gray Drilling Co., Wichita Falls. Straughan will be in charge of Gray's Abilene office.

SHIFTS—

Charles F. Manlove, geologist, Union Oil Co. of California, Lompac to Orcutt, Calif.; **Edward N. Frisius,** Standard Oil Co. of California, Lomita to Big Bear City, Calif.; **Horace R. McCombie,** chemist, Shell Chemical Corp., Los Angeles to Oakland; **Russell R. Simonson,** engineer, Ohio Oil Co., Santa Barbara to Reseda, Calif.; **Ellis W. Hamilton,** engineer, Western Gulf Oil Co., Shafter to Bakersfield, Calif.

E. L. Mount, foreman, Continental Oil Co., Crosbyton to Ballinger, Tex.; **W. M. Shaffer,** foreman, Humble Oil & Refining Co., Livingston to Thompsons, Tex.; **John T. S. Ross,** geologist, Seismograph Corp., Vernon to Gainesville, Tex.; **William F. Neele, Jr.,** engineer, Magnolia Petroleum Co., Austin to Dallas; **James A. Wheeler,** geologist, Tennessee Gas & Transmission Co., Austin to Houston; **Howard H. List,** engineer, Shell Pipe Line Corp., Houston to Cushing, Okla.; **R. W. Blackburn,** engineer, Continental Oil Co., Kilgore, Tex., to Ponca City, Okla.

W. P. Williams, engineer, Pan American Production Co., Dickinson to Gladewater, Tex.; **W. A. Grant, Jr.,** chemist, The Texas Co., Erath to New Orleans, La.; **Paul Johnson,** foreman, Continental Oil Co., Bunkie to Eunice, La.; **Raymond B. Kelly, Jr.,** engineer, Humble Oil & Refining Co., New Orleans to Harvey, La.; **Robert W. Wheeler,** engineer, Shell Oil Co., Inc., Alton to Roxana, Ill.; **Samuel G. Gary, Jr.,** engineer, Carter Oil Co., Mattoon, Ill., to Purcell, Okla.

Dick Lewis, superintendent, C. E. Brehm Drilling & Producing Co., Mt. Vernon, Ill., to Sherman, Tex.; **R. W. Sexton,** engineer, Sinclair Refining Co., Neodesha to Caney, Kans.; **Don E. Evert,** engineer, Union Oil Co. of California, Madison, Kans., to Cut Bank, Mont.; **Joe J. McCullough,** geologist, Union Oil Co. of California, Madison, Kans., to Cut Bank, Mont.; **M. H. O'Connell,** foreman, Tucker Exploration Co., Ltd., Kemmerer to Rawlins, Wyo.

O. V. Dill, foreman, Ohio Oil Co., Cement, Okla., to Oklahoma City; **John C. Padgett,** engineer, Halliburton Oil Well Cementing Co., Claremore to Duncan, Okla.; **James N. Wilson,** geologist, Seismograph Service Corp., Duncan to Altus, Okla.; **Richard A. Aukerman,** engineer, Shell Oil Co., Inc., Oklahoma City to Elk City, Okla.; **F. M. Beal,** engineer, Carter Oil Co., Seminole to Norman, Okla.; **O. N. Knox,** superintendent, Carter Oil Co., Seminole to Tulsa; **J. L. Rogers,** Carter Oil Co., Seminole to Oklahoma City.

DEATHS

John A. Lloyd, director manager of the foreign sales department of Sun Oil Co. since October 1940, died June 20 in Camden, N. J.

Ray Humphries, 53, well-known northern Oklahoma lease and royalty broker, died June 18 in Tonkawa, Okla.

Alexander Hannah, 70, for many years prominent in Alberta oil operations, died recently in Calgary, Alta. Head of the legal firm of Hannah, Nolan, Chambers, Might & Saucier, which handled Imperial interests, Hannah was on the directorates of Royalite Oil Co., Ltd., and other Imperial subsidiaries in Alberta.

Charles E. Kelley, owner of Drake Petroleum Co., Chicago, died recently at Dyer, Ind., while on a motor trip from Florida to Chicago.

George N. Powell, 70, retired official of the Southern group of Pipe Lines, Oil City, Pa., died June 12 at the White Rest home, Tidioute, Pa. Powell went to Oil City in 1912 as traffic manager with the pipe lines unit.

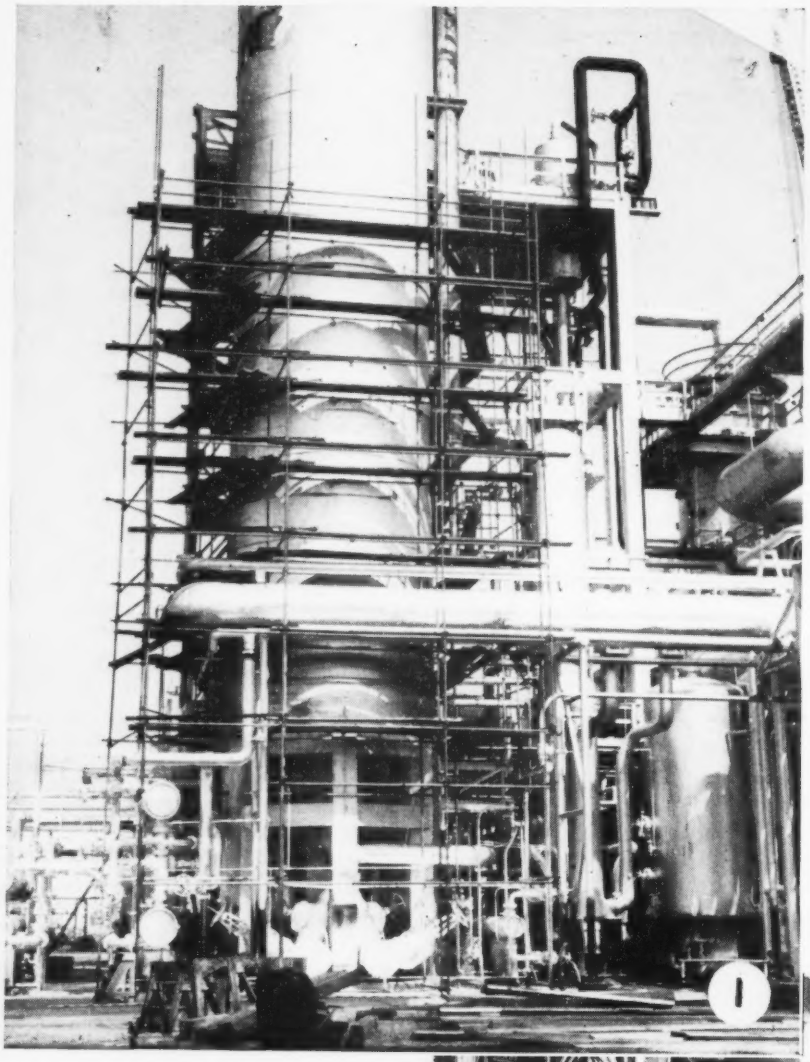
Warren D. Ambrose, 57, died June 19 at his home, Eagle's Nest, on Eagle Mountain Lake, Texas. Ambrose took part in the development of East Texas field and was active in the Independent Petroleum Association of America and other oil organizations.

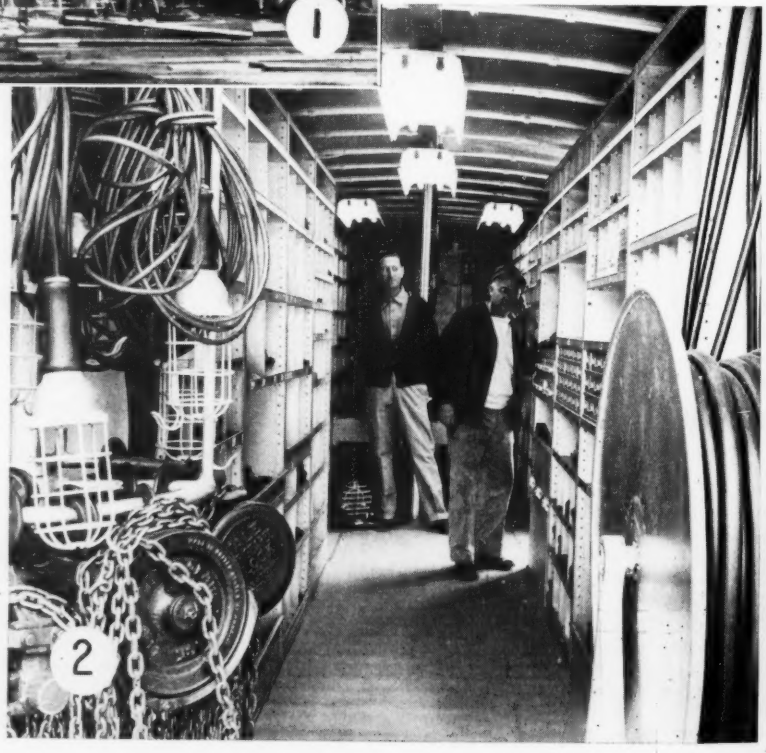
John Henry Borchers, 75, retired employe of Texas Pipe Line Co., died June 18 at Kerrville, Tex. At the time of his retirement in 1937, Borchers was supervisor of the telegraph and telephone department of Texas Pipe Line Co.

FORESTALLING BREAKDOWN OF EQUIPMENT IN A SYSTEM

by R. B. Tuttle

WELL before the beginning of World War II, various methods for forestalling mechanical failures to equipment in refinery processing operations were under test in a number of plants throughout the nation. With the arrival of the war most refineries were being operated on fixed schedules which specified the minimum number of days a given unit in the plant was to be kept on stream before it was shut down for servicing. In nearly every plant which operated on a scheduled shutdown basis, on-stream time for the over-all plant often exceeded the allowed minimum. Without some reliable means of forestalling equipment failures such records as were established on process operations during the war period would have been near impossibilities. Although some of the methods employed during wartime were questionable on an economic basis, they were the means whereby continuity of operation, one of the im-





1.—Sectional metal scaffold frames such as shown here eliminate many of the erection difficulties common to conventional types

2.—Interior of 35-ft. mobile tool room. Two such units are used on maintenance work at the Beaumont, Tex., refinery of Magnolia Petroleum Co.

3.—One of two mobile cranes used in Magnolia's Beaumont refinery. Because of its maneuverability this type of crane is used extensively in maintenance work in this refinery

4.—The rigging and scaffolding used customarily for removing and replacing furnace tubes is not required when the operations are carried out with mobile hoists. The "Krane Kar" shown here is lifting a tube into position for installation in a naphtha polyform heater

portant factors at the time, could be maintained. In nearly all cases where thorough investigations of the economics of a given method were made under peacetime conditions the method met the demands placed on it. However, in a few instances some of the methods and procedures investigated did not stand up to postwar economic requirements.

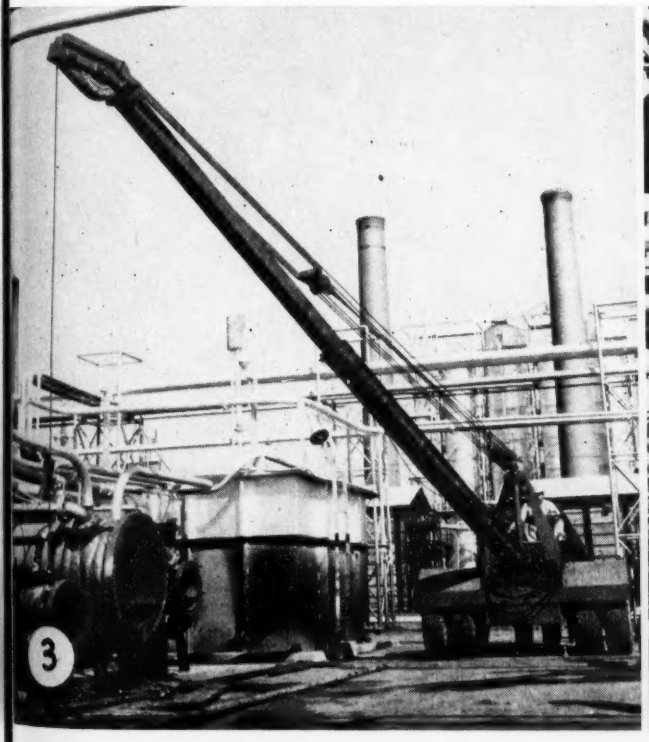
In its earlier days the refining industry in general gave little, if any, thought to making repairs to or replacements of equipment other than that demanded by an emergency. The use of special construction materials which would prolong the life of some important item was passed by also. Usually economy was the argument given when request was made for the repairing or replacing of equipment which although usable at the time, bore indications of limited serviceability. Gradually, in the years leading up to the prewar period, the popular idea that economy could be expressed only in cents per pound or in dollars per unit equipment item, was altered to take into account service life of specific equipment when it was constructed of more durable but more costly materials. Along about this same time the economy resulting from repairing or replacing equipment beyond that required under emergencies was receiving attention to some degree. Subsequently sound engineering principles were incorporated as a major factor in economic studies involving equipment replacements, repairs, and construction materials. So called "preventive maintenance," as employed today in many refineries, is based on findings of these studies.

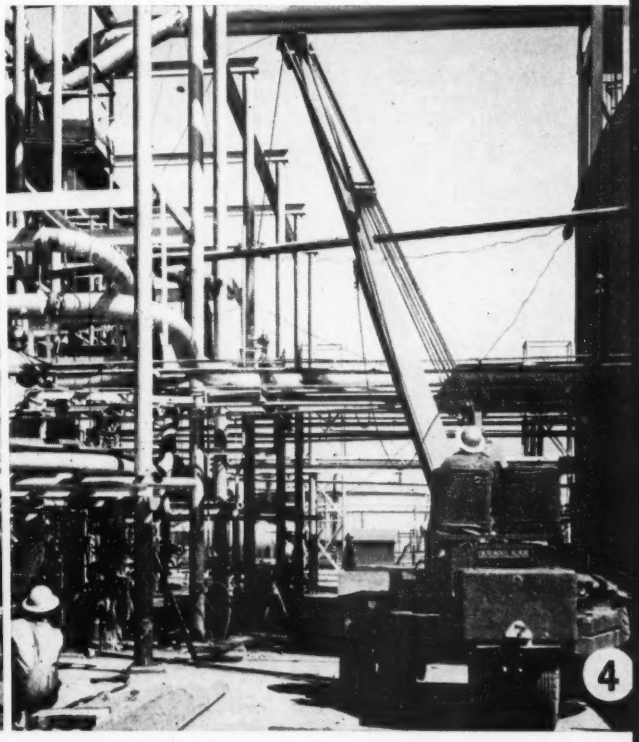
Program

Permanent and Temporary Facilities

Conditions under which refineries were required to operate during the war period did more to stress the importance of preventive maintenance than did any other condition theretofore. Under the demands of emergency many ideas questionable as to their feasibility were incorporated into preventive maintenance programs during this period. Some of these ideas proved successful and a large number of them are employed either in original or modified form today in those refineries where maintenance is considered to be of first order importance to plant operation.

Little recognized generally as affecting importantly the aim of preventive maintenance is the efficiency with which operations concerning its application are performed. In many instances the policies employed in a refinery call for an all-out effort on the part of adequate maintenance in an attempt to avoid emergency shutdowns. However, a large number of these same refineries employ no particular methods or procedures whereby the performance of actual





maintenance operations may be accelerated. The general trend in the direction of speeding up maintenance operations to reduce the over-all time required to service refinery equipment points toward "designed in" facilities in the newer plants and units. As an example, hoists and craneways are made a permanent part of a unit and working areas in and around plant structures are provided particularly for operations of maintenance. Other examples are heavy-duty roadways suitable for large mobile equipment, paved working areas in and adjacent to a unit, and accessibility of all heavy equipment items from low levels. Current design practices consider designed-in maintenance facilities along with the other factors involved in the problems of plant layout. Although the idea of providing permanent structures and the like to facilitate servicing of equipment is not new, it has never been considered as an important factor in plant design until recent times.

Temporary structures such as scaffolds, heretofore and currently in some refineries today, consume considerable time in their erection and removal. Modern maintenance practice employs metal sectional scaffolding which aside from reusability may be erected and dismantled in a fraction of the time required for the older all-timber type. Since working platforms on the sectional-type scaffold are adjustable readily, the number of levels required for a normal structure can be usually fewer than required for a builtup timber scaffold.

Mobile cranes which have maneuverability prove to be an important time saver in maintenance operations. Tube bundles may be removed and replaced with such equipment as may be heater tubes, heavy fittings, and pipe sections, and all of the other miscellaneous lifting jobs that come up during the servicing of a normal processing unit. Equipment of this type is useful, particularly around units which are not provided with builtin hoisting equipment.

There are many angles to be considered in the speeding up of maintenance operations in order to improve the down-time to on-stream ratio of a unit. As a rule this ratio can be improved appreciably when all factors involved are correlated correctly. Since these factors vary even with identical processing units, no marked gain in down time may be realized without complete coordination of maintenance operations. Interdepartment cooperation is the factor which determines the success or failure of any extensive maintenance project, regardless of its basic soundness. Typical of the results of interdepartmental cooperation in proving successful the operation of a broad-range maintenance program is the Beaumont-refinery personnel of Magnolia Petroleum Co., Beaumont, Tex.

Engineering Organization

During the war years the maintenance section of the engineering department at Beaumont operated short handed, as did many of the other departments in that and other refineries. However, during this period several important developments in maintenance were brought out through the cooperative efforts of the maintenance section and the operating and mechanical departments. Since the war's end the section's manpower has been built up to an all-time high. Currently 13 technical and 5 nontechnical men, in addition to the section head, are employed for handling maintenance problems. The section operates without supervisory authority over employes of other departments or divisions.

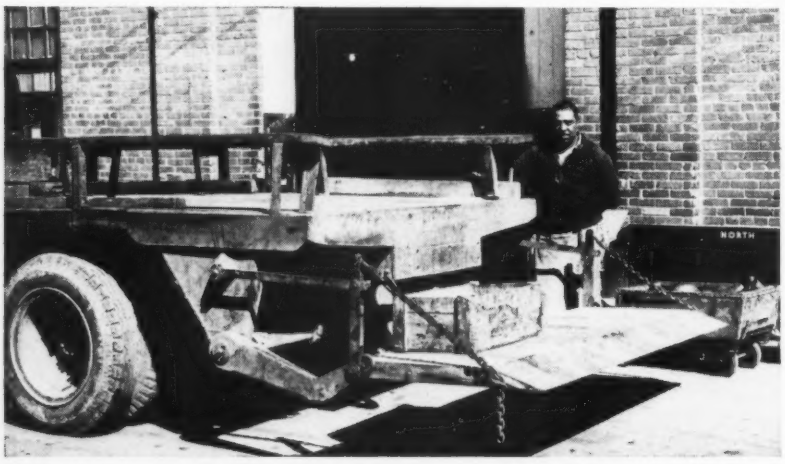
Duties assigned to the section include all problems related directly or indirectly to the maintaining of all of the equipment in the refinery. Rated currently at 125,000 bbl. per day crude-oil charging capacity, the refinery is equipped with catalytic and thermal cracking facilities plus the various other processes employed in a modern refinery for the production of various fuels, lubricating oils, solvents, and waxes.

In the Beaumont-refinery section the maintenance section operates only as a service organization which supplies all of the engineering involved in maintaining all plant equipment. The organization is staffed with a group of engineers, specialists in various fields, who serve in one or more of the section's three divisions. Two of these divisions are headed by assistants to the section head, whereas the third is under direct supervision of the section head, an assistant to the refinery's chief engineer. One of the section's divisions is concerned primarily with corrosion problems; another with the mechanical phase of maintenance; and the third with statistics. Seven engineers, under a division chief, operate in the corrosion division; six men make up the engineering staff of the maintenance division, exclusive of a division chief; and one engineer is employed to handle statistical data for the division. Inspectors are employed for both corrosion and maintenance divisions of the section.

Departmental Duties

The personnel in the corrosion division are separated into five groups, each of which serves a given number of the refinery's processing equipment and facilities. All thermal and catalytic cracking units, including facilities for these processes, are serviced by four engineers. Wax and lube units and their facilities are under the care of another group which includes two engineers. One engineer represents the maintenance section in the refinery's acid plant, alkylation unit, treating and gas plants, and the facilities for these processes. Another engineer services the plant's miscellaneous equipment including yard piping, relief valves, cooling towers, desalting and air conditioning equipment, and blowdown systems. The studying and testing of construction materials and the preparation of specifications are handled by one engineer.

The maintenance division is separated also into four groups which function to serve in maintaining all equipment, structures, and related items. Pumps, turbines, compressors, and blowers are serviced by two engineers as is all the heat-transfer equipment. One engineer handles all problems on tank and conservation equipment. Likewise, one engineer



This device, a Fruehauf elevating end gate, simplifies truck loading. The end gate may be attached simply to any common type truck such as the one shown in the photograph

is assigned to material reclamation and salvage and one to miscellaneous machinery including machine tools, cranes, elevators, and automotive equipment. Currently much money is being spent to improve existing maintenance facilities and for additional equipment. A major portion of this expenditure, on the recommendation of the maintenance section, is going into the streamlining of the refinery's machine, plate, and other shops.

Latest of the plant's facilities to be serviced by the section is transportation. A new garage with modern machinery for repairing and servicing automotive equipment is being constructed at the refinery. To obtain better efficiency most trucks and some passenger cars operating normally within the refinery are being equipped with radios as are two new diesel switching locomotives which replaced two steam switchers, recently. A mail car, pickup truck, and one or two passenger cars are to be equipped with two-way radios as soon as the communication system is completed early this year. To reduce further job-to-job traveling time of the various trucks and other automotive equipment, in the plant, a system of streamlined roadways and tracks is being installed. With the new roadway system and with vehicle dispatching handled from a central location, two-way hauls and quicker on-the-job arrivals of materials resulting therefrom are expected to improve maintenance operations appreciably.

Inspection Records

Each of the crews or groups in the corrosion division keeps accurate records of its findings on each individual item installed in the process which it services. After each turnaround inspection, the information obtained by the crew is analyzed. This analysis is the basis of subsequent recommendations covering replacements and repairs to be made on the unit during its next scheduled shutdown. In cases where the time involved in procurement of repair and replacement materials is an important factor, such items are placed on order sufficiently early to allow ample time for their delivery. Normal demands on replacement and repair items are usually taken care of from plant warehouse stocks but when exceptions come up the items involved are handled as described previously.

After decisions have been made on the exact extent of the maintenance work to be made on a given unit, the section prepares its work order which is issued 5 days before the tentative dates set for the unit's scheduled shutdown. Copies of these orders are given to the master mechanic who supervises all of the different mechanical divisions operating in the refinery. Where some unusual condition involving the services supplied by the mechanical department is anticipated the master mechanic is informed of the probable condition well in advance of the issuance of the work orders so he may have time to develop plans for handling the work involved. However, under normal conditions, operations in the mechanical department are performed on a streamlined basis and even when it is called on to supply some special service its operations seem to follow along routine channels which indicates good coordination and close interdepartment cooperation.

Pumps, Exchangers and Machinery

The pump division of the maintenance section inspects and keeps records on more than 1,600 pumping units, 200 turbines, and 100 air and gas compressors. The history records on pumps and associated items cover a period of several years and include detailed information on repairs and replacement parts. The records on this type of equipment are maintained in the same manner as the so-called perpetual-inventory records employed for most warehouse stocks. Regardless of how many times a pump, compressor, or turbine has been repaired or some of its parts replaced since the record system has been in operation, exact specifications on its current status are available from the record. Even the type and amount of packing and when such was installed is included in the record along with maintenance costs on the given item to date.

Exchangers, including all types of heat-transfer equipment, are handled in a similar manner to that setup for pumps and related items. More than 800 heat-exchange units are in use in the refinery, for which 200 spares are kept in standby condition. Records kept by this division include a file on manufacturers' drawings and costs or repairs and replacements for each heat-transfer unit. In cooperation with the corrosion division, the heat-transfer-equipment group inspects all equipment coming under its responsibility. Data on the inspection findings are incorporated into the corrosion and inspection group's reports. The economics involved in replacement of some given unit with one which is shown to require less repairing is also the responsibility of the heat-transfer group.

In cooperation with the mechanical department the machinery group in the maintenance division issues specifications on all replacement machinery and on new equipment. Inspections on both new and on operating machinery are conducted by this group and complete file on maintenance costs of each item is kept by the group. Working with the technical department the group supplies the operating and mechanical departments with instructions for the lubrication of all plant machinery.

The group which handles inspection and maintenance on tanks and related equipment is charged with several major responsibilities, among which are: conduct continuous research on evaporation losses; recommend venting equipment; vapor-recovery systems or other conservation mediums; and plan corrosion protective measures. This group also maintains a repair-cost, specification, and manufacturers' drawing file on each item for which it is responsible.

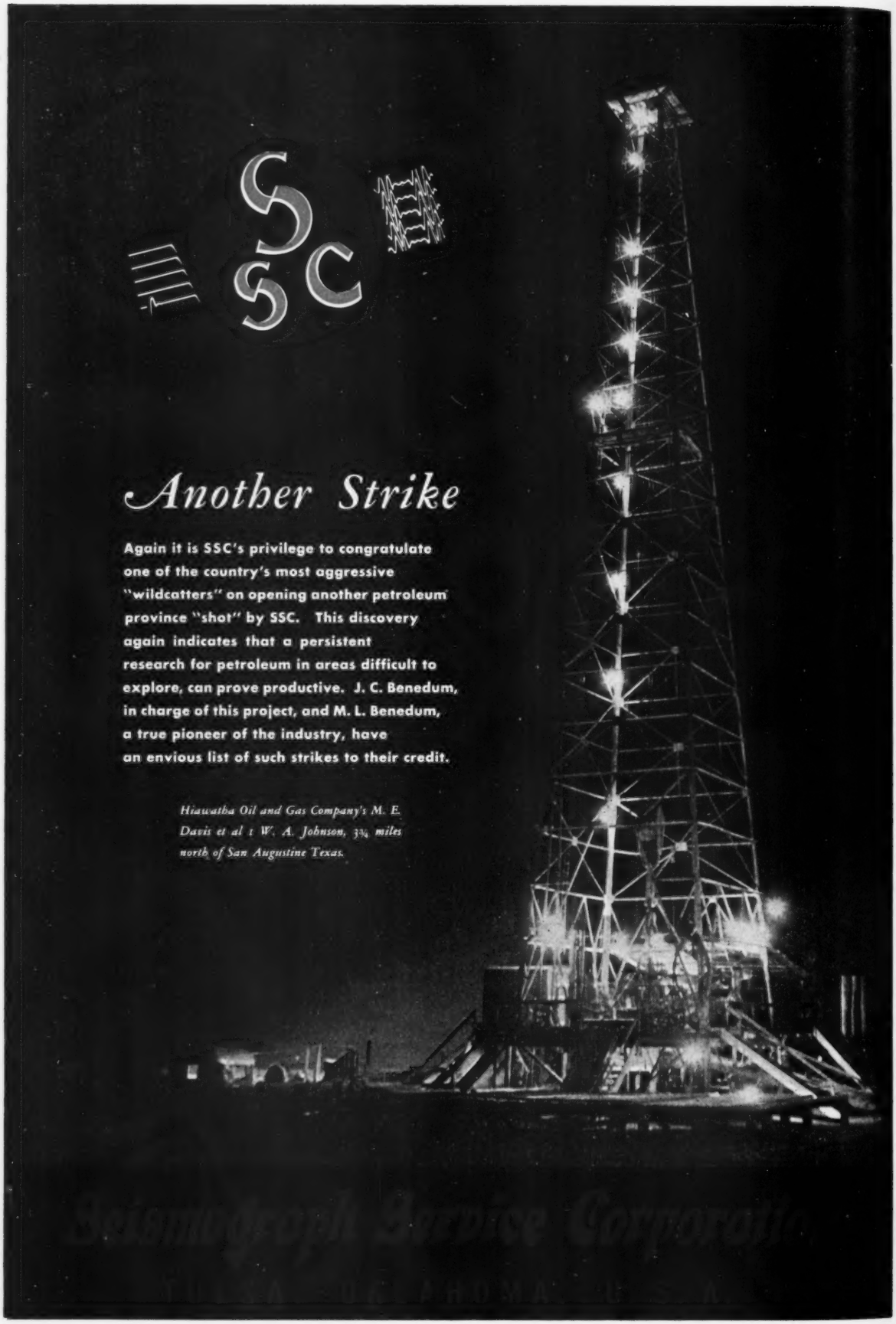
Operations of the material salvage and reclamation group are much different in general nature from those of the other groups in the maintenance section. This group functions principally to determine the economic feasibility in reclaiming equipment items which have been rejected as unsuitable for further use because on-the-job repairs were impractical or because of various other reasons. Without regard as to why an item has been placed at its disposal, this group, in cooperation with the other departments, determines whether or not a particular item is to be scrapped or salvaged. Often an item rejected as unserviceable in one unit is reclaimed for operation in another process and at a substantial over-all saving. Incidentally this group is the only one in the maintenance section which may be said to have earning capacity.

Statistics and Accounting

Much of the work performed by the statistical group is of routine nature and deals with matters pertaining to issuance of work orders and the preparation of progress reports on the work involved. Job-cost breakdown is another of the group's normal duties, as is the keeping of various records on equipment for the section's other divisions and groups. Some special work involving issuance of work orders covering emergency work and preparation of special cost tabulations on some given job is also done.

The group has devised an accounting system which is applied generally to any job whether it be to cover work on scheduled maintenance operations or emergency shutdowns. Under this system code symbols are assigned to specific operations much in the same manner as are employed in other accounting procedures. In order to insure more accuracy than is obtained customarily on field cost distribution, each unit in the plant is provided with a large, weatherproof sign board on which all of the cost-distribution symbols covering various operations are painted. A section on the board is provided for inscribing temporarily the work order in effect currently at the particular unit. The idea of displaying job-cost

(Continued on page 142)


SSC
Another Strike
Again it is SSC's privilege to congratulate one of the country's most aggressive "wildcatters" on opening another petroleum province "shot" by SSC. This discovery again indicates that a persistent research for petroleum in areas difficult to explore, can prove productive. J. C. Benedum, in charge of this project, and M. L. Benedum, a true pioneer of the industry, have an envious list of such strikes to their credit.
Hiawatha Oil and Gas Company's M. E. Davis et al 1 W. A. Johnson, 3¾ miles north of San Augustine Texas.

Effect of Bacteria ON OIL PRODUCTION

by Charles J. Deegan

PART 2

THE first experiments to see if bacteria could actually bring about an increase in oil recovery were started in the late summer of 1946. Diamond cores of the Bradford Third sand at a depth of about 1,500 ft., were taken from a well near the city of Bradford. The well was a five-spot location, midway between a water-input and a producing well.

The sand had been subjected to high-pressure water flooding (1,500 psi. surface pressure) for 6½ years. The cores were examined by an outside commercial laboratory and classified "flooded out." This is a commercial term in common usage, meaning "commercially flooded out by present known techniques." Actually the report itself showed that one of these cores still contained oil saturation to the extent of 35 per cent of the pore space.

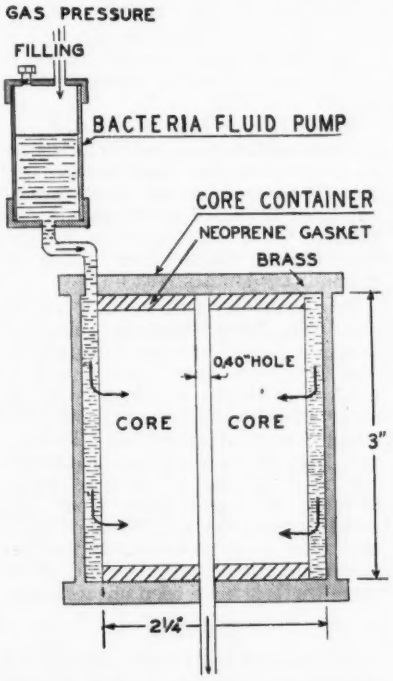
The cores were 2¼ in. in diameter. A 0.4-in.-diameter hole was drilled vertically through the center of the cylindrical core. Then a saline solution containing minerals especially favorable for bacterial growth was forced through the core radially, by injecting it into the center hole. This was done by using a gas drive on the solution (to maintain oxygen free conditions). The core took the solution at 5 psi. at a rate comparable to the rate of flow of ordinary lease or flood water.

Next from 5 to 7 qt. of various bacteria cultures were injected into the cores, 1 qt. at a time. The general results were as follows:

1. No oil was produced.
2. Some bacteria came through the core and showed up in about 36 hours in the fluid recovered after passing through the core.
3. Hydrogen sulfide gas, which was present in the original bacteria culture prior to injection, due to the activity of the bacteria, came through the core in 20 to 30 minutes.
4. Except in one very tight core, the input rate remained about the same after the bacteria culture was injected as it was before, indicating no appreciable tendency for the bacteria to plug up the cores.
5. In all, six different strains of bacteria were injected; one strain through two of the cores, and five strains through a third core. Of the five strains through the third core, one was a duplication of a strain previously run through the first core.

Results of Experiments

The Bradford group concludes that these experiments proved:



Sketch of core experiment apparatus, showing in cross-section view, how cores of Bradford Third sand were flooded under pressure exerted around outside of core to force bacteria solution through core to drain into a vertical hole in the center of the core

Dr. Jay V. Beck (left) discusses bacteria research progress in his Bradford, Pa., laboratory with Dr. Claude E. ZoBell (right) from Scripps Oceanographic Institute

1. That sulfate-reducing bacteria could be injected into a Bradford sand under pressure and penetrate the sand, surviving with no apparent ill effect.
2. That the particular strains tried were unwilling (on this trial), or unable to work on freeing the oil that remained in the cores.

Dr. ZoBell agrees with these conclusions as to this particular experiment, but feels that perhaps different results might have been obtained if the injected bacteria had not been originally put in such a rich nutrient solution. In other words the bacteria were exceptionally well fed prior to injection. He feels that leaner and hungrier bacteria might have brought different results on injection, since they would be more apt to seek a food supply in the core.

After the negative results, so far as oil yields were concerned, of the core experiments, consultations were had with Dr. ZoBell. It was decided to try additional strains of promising-looking bacteria from his California laboratory, and to start with highly favorable conditions for the bacteria to work on.

A substantial quantity of unconsolidated sand was prepared by sterilizing it at 375° F. in an oven for 3 days. This is believed sufficient to remove all connate water and to kill all native bacteria in the sand. The sand was then taken out of the oven, cooled, and 10 per cent by weight of Bradford crude oil added to saturate it.

Fifty-five bottles were then prepared and partly filled with this oil-saturated sand. In six of these bottles, used as controls, only the mineral solution favorable for bacterial growth

Left: Dr. Beck examines a bacteria culture in the Bradford laboratory. At right is shown the temperature controlled oven in which samples of oil-saturated sand are kept in glass bottles filled with bacteria solution. Upper shelf shows a group of samples being tested. Bottles are inverted and released oil will float to top of bottle. Samples are kept in darkness, except for such short exposures as are necessary for occasional inspection and handling. Right: Dr. Beck discusses bacteria experiments at Bradford laboratory with J. P. Jones (center) and Dr. Richard V. Hughes (right); director of production and director of production research, respectively, for Pennsylvania Grade Crude Association

was added, but no bacteria. As an additional precaution, a bactericide was added to these to kill any bacteria present. To the other 49 bottles, the mineral solution for food, plus bacteria cultures were added, a different culture in each bottle.

When the mineral solution, either alone or with bacteria cultures, was added, it displaced a certain amount of oil in the saturated sand. This oil was carefully removed. All bottles were allowed to stand from 16 to 18 hours, during the removal of this mechanically displaced oil, until there appeared to be no more oil coming up. The 55 bottles were then sealed and incubated at a constant temperature of 27° C. or 79½° F. from December 6, 1946, to January 15, 1947, or about 6 weeks. Upon examination at the end of this period, the following results were found.

Amount of oil released—	By bacteria cultures	By sterile controls
Zero to 10 mg.	36 samples	3 samples
11 to 20 mg.	6 samples	2 samples
21 to 30 mg.	1 sample	0 samples
31 to 40 mg.	3 samples	1 sample
41 to 50 mg.	1 sample	0 samples
51 to 60 mg.	0 samples	0 samples
61 to 70 mg.	0 samples	0 samples
71 to 80 mg.	1 sample	0 samples
81 to 90 mg.	1 sample	0 samples
Total	49 samples	6 samples

In the six control samples with no bacteria, varying amounts of oil were found at the surface, ranging from 4 to 36 mg. In the 49 bacteria-inoculated samples, varying amounts of oil were found at the surface, ranging from 1 to 83 mg.

On a basis of the work up to the early spring of 1947, the Bradford group had concluded that bacterial cultures might have released minute quantities of oil from the saturated sand samples. The bacterial activity had definitely continued after injection of the cultures into the bottles containing the artificially saturated oil sand. This was proved by the presence of hydrogen sulfide in the bottles, since hydrogen sulfide is a byproduct of the activity of the bacteria.

Dr. Jay V. Beck, the microbiologist, with true scientific conservatism, would only say:

"Tests to date have shown that cultures of sulfate reducing bacteria may be able to release small amounts of Penn Grade crude oil from unconsolidated Bradford Third Sand." Additional work is necessary to confirm encouraging observations made in preliminary studies.

Two unrelated cultures of bacteria, one containing bacteria obtained from Dr. ZoBell, and one culture from the Bradford area have shown a marked hydrogen sulfide production, about 10 times that usually obtained using a mineral salt-crude oil medium. Both of these cultures contained organisms of the vibrio type which differed in appearance from the usual comma, or spiral-shaped cells found in most cultures. Initial attempts to further culture and study these bacteria have been unsuccessful.

Objective

Dr. Richard V. Hughes, director of production research, Penn Grade Crude Oil Association, under whose direct supervision Dr. Beck's work was carried on, expressed the view of the research director, which must necessarily be broader and longer ranged than that of a purely experimental scientist working on a specific problem. Dr. Hughes states:

"To me, the most significant fact about our experiments to date, is that one culture of bacteria released nearly three times as much Pennsylvania Grade crude as the highest blank control showed, and seven times as much as the average of the blank controls.

"Two other cultures released substantially more than the blank controls. Our objective is the finding or development of one or more cultures of bacteria that will be very efficient for this purpose. The results of the test indicate that there are substantial differences in the ability of the various cultures along these lines. Therefore we have good reason for hoping we will find still more powerful cultures."

J. P. Jones, director of production, Pennsylvania Grade Crude Oil Association, under whose administration all production research activities are carried on, expressed the business man's point of view. He states:

"From a strictly business point of view, few new things work perfectly in the early stages. The results to date, according to a business man's ideas are these. Trial No. 1 missed the target. Trial No. 2 looks as though it may have hit the edge of the target. If subsequent trials confirm this impression of No. 2, we are on the track of something that will some day be extremely profitable to the operators in the Pennsylvania Grade area."

However, if one interprets too much optimism in these statements, it is misleading. These men are fully aware of the size of the job implied in working on practical applications

WHY THIS EMBLEM INTERNATIONAL IDENTIFIES GREAT TRUCKS FOR OIL FIELD TRANSPORT

International Trucks from the smallest to giant six-wheelers—from half-ton pickups to huge "Oil Field Specials" built at International's Emeryville, Calif., plant—are busily at work every day throughout America's great oil industry.

These trucks demonstrate every day the reason why the famous International Triple Diamond Emblem identifies great trucks—greatness that is designed in, engineered in and built in.

Take these two six-wheelers as examples—the KB-8-F and the KB-11-F—two of 15 New International KB Models.

The KB-8-F has a gross weight rating of 27,000 pounds. It is available in four wheelbases: 161, 179, 197 and 215 inches. It is powered by the famous International Red Diamond 361 Engine, which develops 126 brake horsepower at 3000 r.p.m., and 282 pound feet of torque at 1200 r.p.m. If greater power is required, the International Red Diamond 401 Engine is available.

The KB-11-F has a gross weight rating of 37,000 pounds. It is available in three wheelbases: 161, 197 and 215 inches. It is powered by the International Red Diamond 450 Engine, which develops 148 brake horsepower at 2600 r.p.m. and 360 pound feet of torque at 1000 r.p.m.

For every oil field transport job there is a rugged, dependable, economical International of the right size, type and power. For details consult your International Dealer or Branch.

40th ANNIVERSARY OF INTERNATIONAL TRUCKS

1907-1947—Forty Years of International Truck Service to Commerce, Industry and Agriculture

INTERNATIONAL TRUCK SERVICE

Top quality, expert and economical! Quickly available everywhere from thousands of International Dealers and the nation's largest company-owned truck-service organization—International Branches.

Motor Truck Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue
Chicago 1, Illinois

Tune in James Melton on "Harvest of Stars" Every Sunday! NBC Network.

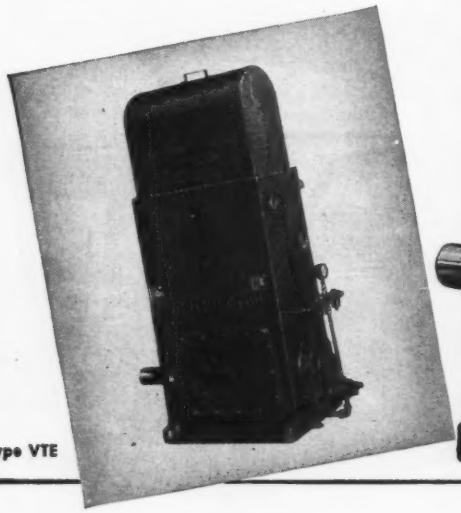
INTERNATIONAL

INTERNATIONAL *Trucks*

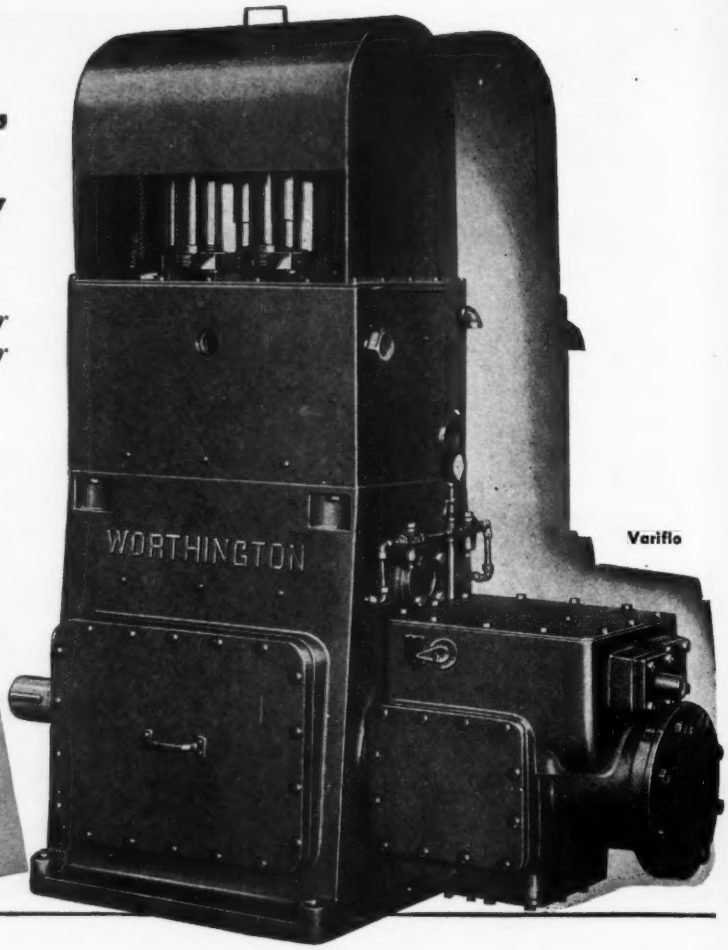
"PUTTING THE PRESSURE ON"

Smoothly . . . Exactly ...Automatically

Here's stepped-up efficiency for pipe line pumping and many other high pressure services!



Type VTE



Variflo

Positive, Accurate Capacity-Control

Operating at constant speed, Worthington Variflo Triplex Pumps regulate capacity by a simple, rugged eccentric which adjusts the plunger stroke to any degree from zero to 100%. Variation is completely *stepless and automatic*, with smooth, positive action that saves power over the entire capacity range.

Type VTE

Except for the crankshaft elements, the simple, compact, accessible design of Worthington Type VTE Triplex Pumps is identical with the Variflo's. Where variable capacity is not required, they perform with the same high dependability that proves *there's more worth in Worthington.*

Flexibility!

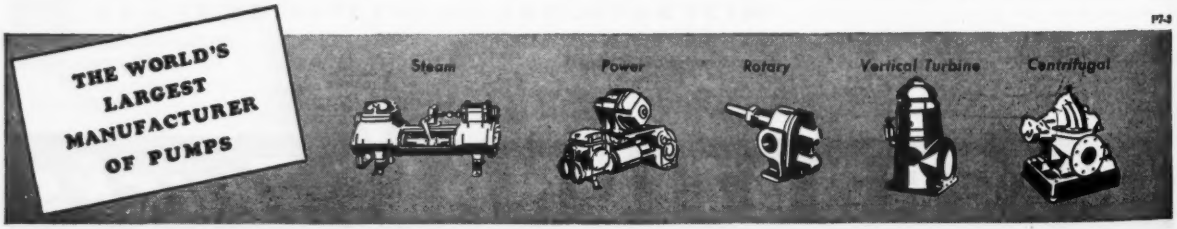
Variflo-VTE combinations can be installed to give stations complete capacity-control, with interchangeable parts and reduced first cost.

Constant Speed — Constant Savings

In Worthington Variflo and VTE Pumps the mechanical superiority and money-saving advantages of constant speed design have been developed to their fullest. Available in all sizes up to 150 hp per unit. Write for bulletins to *Worthington Pump and Machinery Corporation, Reciprocating Pump Div., Harrison, N.J.*

WORTHINGTON

THE WORLD'S LARGEST MANUFACTURER OF PUMPS



of micrbiology to oil-recovery problems. They feel the field of potential research with reasonably promising prospects is so huge that their financial resources could not even scratch the surface. They hope that many other groups will come into the field. Dr. Beck feels that barring an early stroke of luck, hundreds if not several thousand microbiologists might well work several years before even bringing to the first commercial stages, all of the possibilities.

Problems

For instance, it is not at all sure that there are not two or more different types of sulfate bacteria with different properties. It may be that one type produces the detergent or wetting agent that has the power of stripping oil, and possibly connate-water films from sand grains. It may be an entirely different type that acts by physically crowding the oil and water off the sand grain.

If a strain of bacteria could be developed that specialized in producing the detergent agent, two possibilities open up. One is that the bacteria could be cultured at the surface, in a factory, to produce the detergent, which would be continually removed from the solution, just as penicillin and certain other substances are "manufactured." If this could be done cheaply enough, the detergent agent could then be introduced with the flood water in secondary recovery to increase oil properties. This would have the particular advantage of not requiring any substantial over-all changes in present field-operating techniques.

A second possibility is that if such a detergent could be found and separated, it might be subject to sufficient analysis of its structure that artificial synthesis would be possible. Then chemical manufacture of the detergent agent might be possible. Injection of this into the flood water would follow.

Other Possible Applications

One possibility that may be investigated by the Penn Grade group is that of developing a strain of bacteria that are particularly effective in attacking paraffin and causing it to disintegrate. In some parts of the Penn Grade area, field problems from paraffin are numerous. If a cheap bacterial method of overcoming these could be developed, the operators would benefit by eliminating many expensive cleanout jobs.

Another possibility is a byproduct in reverse from encouragement of bacteria growth. This is a search for an effective bacteria killing agent, or bactericide. Some promise has been shown in laboratory work on this problem. The objective is to get a cheap, effective bactericide to eliminate algea and all other forms of organic growth which cause plugging of the sand face on input water wells.

Some consideration has been given by the Penn Grade group to the possibility of developing an effective bactericide to work on the types of bacteria that are known to accelerate corrosion.

So far as is known to the author, no one is working on the possibility, suggested in the ZoBell patent, that bacteria might be used in breaking heavier hydrocarbons into lighter ones. One of the major companies is known to be doing some research work in connection with its refining proceses. It is believed that this is along the line of developing bacteria that will attack the mercaptans in gasoline fractions. The hope is that a still cheaper method may be developed to remove mercaptans and other sulfur compounds that reduce the lead susceptibility of gasoline, thereby stepping up the octane rating.

Paraffins May Be Unsuitable

The Bradford group, while reluctant to commit themselves, have a feeling that crudes with a high percentage of paraffin series hydrocarbons may be less susceptible to bacteriological attack than mixed-base crudes. They would like to see other groups carry on experiments on mixed-base crudes. Their province, because of the source of financial support, is limited strictly to the Penn Grade area.

Dr. ZoBell does not feel that this impression is likely to prove correct. However, the contact between California and Bradford has not been as close as both parties would have liked, due to circumstances beyond either party's control.

Dr. ZoBell seems to think it is largely a matter of developing purer strains of more effective bacteria. Most of his work has been with synthetic sediments, because his research was confined to fundamental mechanisms, not to practical applications. His quantitative data have not been released, but he says he has achieved much higher results than those indicated in the Bradford experiments. He has released oil from the Athabasga tar sands, from six or seven limestone cores from oil fields, and from the Santa Maria oil shales. These Santa Maria shales contain true oil, ordinary hydrocarbons; not the kerogen organic material that is found in the so-called "oil shales."

Just how much individual company research activity in microbiology is going on cannot be determined. Judging, however, from the steady stream of visitors, mostly research scientists of the various oil companies, to Scripps Institute in La Jolla, Calif., and to Bradford, there is either a good start being made, or there is a lot of company effort in the planning stage. There is further confirmation of this in the fairly numerous requests for names of qualified microbiologists that are being received by various institutions.

When

PAINTS WON'T

stop corrosion

UCILON WILL!

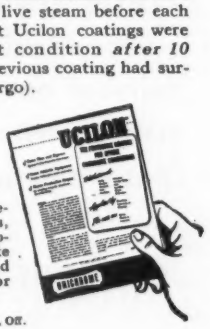
HUNDREDS OF USERS report that Ucilon 400 is *more* resistant to *more* corrosives for *longer* periods than any other coating they've ever applied! And it's especially suited to the severe service conditions found in the oil industry —as shown by remarkable endurance records on tankers, in the field, in storage tanks. If you have a job too tough for paint, we want it. For we believe plastic-based Ucilon 400 will outlast all other coatings you have tried—and cut your maintenance costs as well.

FACTS ON SERVICE

UCILON 400 was tried in a tanker's hold, which carried 100-octane gasoline, diesel oil, kerosene, salt water ballast. The hold was flushed with live steam before each cargo change. Yet Ucilon coatings were still in excellent condition *after 10 months!* (No previous coating had survived even one cargo).

SEND FOR THIS BULLETIN

It gives you more details on properties, types of coatings, application data. Write your nearest United Chromium office for your copy.



®Trade Mark Reg. U. S. Pat. Off.

UCILON

PROTECTIVE COATINGS

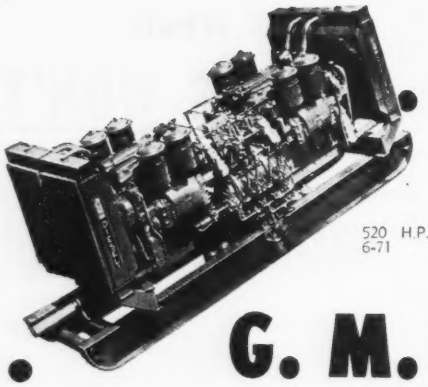
UNICHROME

products of

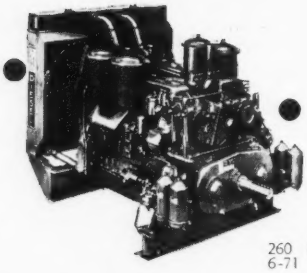
UNITED CHROMIUM, INCORPORATED

51 E. 42nd St., New York 17, N. Y.

Detroit · Waterbury · Chicago · Dayton · Los Angeles



520 H.P., Quad 6-71



260 H.P., Twin 6-71

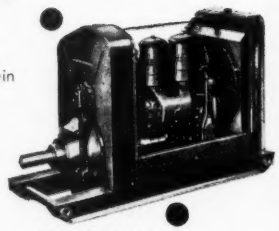
G. M. DIESELS

Installed by

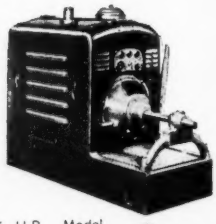
STEWART & STEVENSON SERVICES

Provide Top Performance with Maximum

PARTS INTERCHANGEABILITY

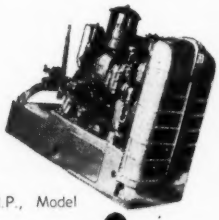


130 H.P., Model 6-71

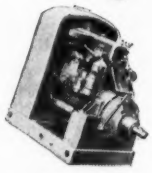


87 H.P., Model 4-71

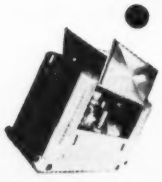
● No matter if it is a 520 H.P. Diesel drilling engine or a small 10 K.W. rig lighting plant, the same piston fits them all because practically all parts are interchangeable no matter what size engine you select, if it is a series 71 General Motors Diesel. Whatever your requirements may be, we have a dependable G. M. Diesel to fit the job. Prompt delivery on power units, utility units, rig lighting plants, switch boards, and all models of G. M. Diesel engines! Write or phone for full information.

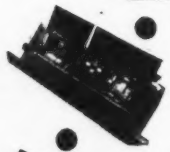


65 H.P., Model 3-71



43 H.P., Model 2-71





10 K.W. to 30 K.W. Rig Lighting Plant

STEWART & STEVENSON SERVICES, Inc.

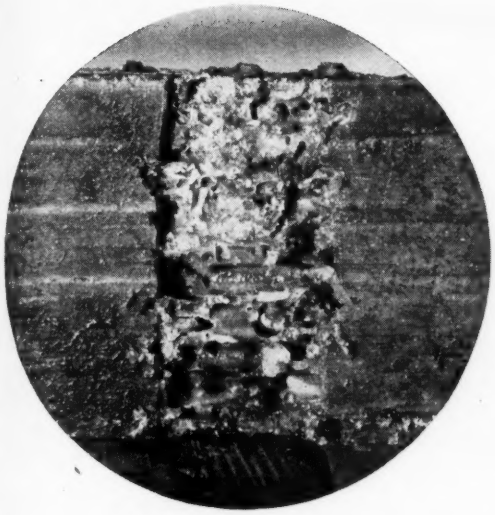
HOUSTON, 4516 Harrisburg Blvd., Phone W. 6-9691; CORPUS CHRISTI, 643 N. Port Ave., Phone 8252; DALLAS, 4801 Lemmon Ave., Phone L. 6-6649; McALLEN, 19 East Highway, Phone 1019; WICHITA FALLS, P. O. Box 1450, Phone 3319 ★ Sales Representatives: Tyler, Livingston ★ Dealers: Lyons-Peickert Motors, Laredo; H. W. Lewis Equipment Co., San Antonio ★ Distributors: General Motors Diesel Engines, Continental Red Seal Engines, Hallett Diesel Engines ★ Fabricators: Electric Switch Boards, Electric Generator Sets, Electric Control Equipment.

GM GENERAL MOTORS DIESEL POWER

Auxiliary Combination—generator set, air compressor, accessory drive, pump, electric welder.

Anywhere... **PARTS • SERVICE** *...Anytime*

THE NATION'S LARGEST DISTRIBUTORS OF G. M. DIESEL ENGINES



Damage caused by sea life, in addition to corrosion, is studied at Kure Beach. Wood specimen with cut-away section above illustrates results of attack by the Teredo

Companies Unite Against Ravages of Salt Water in Research at Kure Beach

OCEAN LABORATORY

by Warren W. Burns

WITH more than $200,000,000 annual loss attributed to the corrosive effects on this nation's 250,000 miles of pipe lines, the cathodic protection tests alone, now being carried on at Kure Beach, N. C., will well justify the few hundred of thousands of dollars being spent in seeking the most effective methods to combat this costly damage.

But cathodic protection is only one of many features of tremendous importance to industry included in the Kure Beach testing facilities. This was made clear early this month when a group of business paper editors were guests there of International Nickel Co., Inc., Dow Chemical Co., and Carnegie-Illinois Steel Corp.—the three companies which share maintenance and development costs.

Perhaps the most significant feature of the Kure Beach Testing Project is the manner in which producers of competitive projects unite to fight a common enemy—corrosion. Data accumulated over the years (and the project is now in its 12th year) are freely exchanged and available to all industry as well as to government agencies. Moreover, metals from foreign companies also are sent here to be tested and are given the same careful consideration as if those companies were helping to defray costs.

Facilities of the site, including the basin and pump house formerly used to deliver sea water to the Ethyl-Dow Chemical Co.'s bromine plant, no longer operating there, are provided by that company. The project was developed by F. L. LaQue, who is in charge of the corrosion engineering section of International Nickel's development and research division, and operates under his careful direction. LaQue was on hand early this month with a battery of experts explaining and answering hundreds of questions from the business paper editors.

The sea water corrosion testing station was established by International Nickel in 1935 to compare corrosion resistance of low alloy steels with carbon steel. However, other materials were added to the program and today comparative tests are being made on all kinds of ferrous and nonferrous metals and alloys. In addition, the testing facilities have been extended to observe the behavior of several kinds of protective coatings—both metallic and organic, including antifouling formulations, the effects of marine growth on wood as well as on metals, and even the results of exposure to sea spray and sea air on rope. In 1940, Dow Chemical, Carnegie-Illinois Steel, and American Rolling Mills Co. joined Inco in setting up atmospheric test racks.

The atmospheric test lot provides for 40 racks, each of which will support from 700 to 900 specimens. At present the number of specimens exposed there is about 15,000, a number believed to be the largest on test at a single testing station anywhere in the world. The expense of preparing these specimens for test and caring for them makes the investment total well over $300,000. By means of elaborate charts and data books, the history of every single specimen can be quickly checked. However, with the memory of LaQue of Inco, J. A. Peloubet of Dow Chemical and C. P. Larrabee of Carnegie-Illinois Steel, the books would appear to be almost unnecessary.

With the ocean literally "in a test tube," the effects of tides and other marine factors are thus captured exactly as they exist along the shore

Marine testing basin, showing intake of ocean water. In foreground is a portion of the multitude of racks on which specimens are suspended in the water for corrosion studies

line, a few feet away, except that strong bulkheads break the force of the surf. Among the advantages provided at this site are:

1. A continuous supply of full strength sea water, uncontaminated by industrial wastes, oil films or other pollution that interfere with tests in harbors or near big cities.

2. A relatively wide range of sea water temperature (45° to 85° F.)

3. A long season of growth of a large number of marine organisms (of particular value in studying antifouling alloys and coatings).

4. Protection against the physically destructive effects of storms and high waves.

5. A moderate fluctuation in water level which permits observation of waterline and intermittent immersion effects when desired.

6. Adequate protection to prevent the theft of or tampering with specimens.

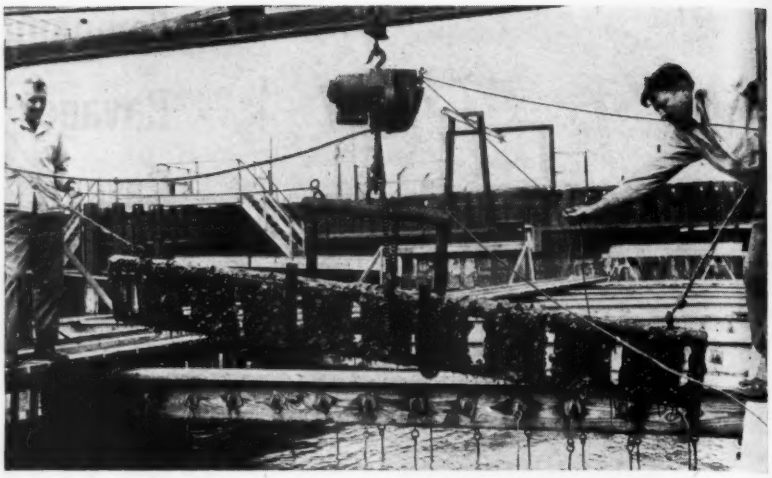
7. The availability of personnel and mechanical equipment needed to erect the testing equipment, keep it in repair and handle the heavy racks of test specimens.

The necessity of providing facilities for the exposure of specimens to attack by sea water and marine atmospheres under natural conditions has been demonstrated by the limited practical usefulness of laboratory tests on relatively small specimens in simple salt solutions, synthetic or reconstituted sea water, or in salt spray boxes. Laboratory tests provide a valuable supplement to tests under natural conditions — particularly in preliminary investigations and in throwing light on the mechanisms of sea water corrosion and the factors that control it.

Has Natural Conditions

However, sea water is something more than a mixture of chemicals; it is a living thing, and its corrosive reactions over an extended period (and at Kure Beach "an extended period" often means many years) can be studied properly only by the exposure of specimens to attack under natural conditions. Comparative tests at Kure Beach and in synthetic sea water in the laboratory have shown definitely that the laboratory conditions are quite inadequate for measuring the behavior of metals and alloys. In the sea water tests, most specimens are exposed on racks continuously immersed at a depth of from 3 to 4 ft.

In describing how the strongly corrosive action encountered at the atmospheric testing station was withstood successfully by specimens of stainless steel, particularly where the chromium and nickel contents were high, LaQue said the same held true for aluminum, nickel and magnesium alloys. Ordinary carbon steels and irons possibly fared the worst, especially when copper content was as small as 0.004 per cent. Samples containing such small amounts of copper exposed for 18 months or more rusted away in layers.



Workers removing rack with test specimen for periodic study of results of its exposure to ocean water

The best performances were obtained from steels with nickel contents of 0.5 to 5+ per cent, in some instances with copper up to 1 per cent and from other more complex steels containing chromium, nickel, copper and molybdenum in different combinations. Some of the better steels lost only 10 grams through corrosive action in 41 months, while other steels lost over 100 grams in the same period of time.

Samples of steel with sprayed or "metalized" coatings resisted well the severe conditions at Cape Fear. In this group were specimens coated with zinc, aluminum and lead. Hot-dipped zinc coatings also afforded excellent protection to steel, as did special coatings of nickel-zinc alloys. While galvanized coatings as light as 0.75 ounce per square foot (including coatings annealed after galvanizing) were providing good protection after 4½ years, it was evident that the heavier coatings, that is, up to 2.5 per cent ounce per square foot, would be more durable. Samples of steel coated with baked phenolic varnishes which had been left outdoors for 2 years showed only slight chalking on their surfaces. Plain and alloy cast irons turned a deep reddish brown in this atmosphere but resisted corrosion well as compared with the ordinary unalloyed steels.

Tests were made with "buttons" of stainless steel combined with other metals, consisting of washers of various sizes piled in pyramid fashion so that each sample left a circular margin. It was noted that with Monel and stainless forming a galvanic couple stainless fared even better than it did by itself in these tests. Similar results were observed in combinations of stainless steel with lead, zinc, copper, brass, and aluminum. And oddly enough, the other metals did not appear to have suffered greatly from their contact with stainless steel in this atmosphere. Monel metal, a natural alloy of about 70 per cent nickel and 30 per cent copper, was used in the construction of the test frames at the atmospheric station.

While inspecting Dow Chemical's cathodic protection tests, the visiting editors were told that at present such a test is being conducted on "the dirtiest, most rusty tanker we could find" to determine the best method of preventing sea water corrosion on the inside. Sea water is used for ballast when tankers are not carrying crude oil or petroleum products. The corrosive effects of this sea water ballast runs into many thousands of dollars of damage yearly.

Cathodic protection seeks to stop corrosion by supplying, from an external anode, the current demand of the local cathodes on the metal surface. This saves the local anodic areas by relieving them of the need to supply this current. Cathodic protection makes the entire structure to be protected the cathode of an electrolytic cell. This "battery" is deliberately set up by installing expendable anodes in the surrounding soil or water. And of all the metals usable for this purpose, extensive laboratory and field tests indicate that magnesium is the most effective. While magnesium cannot plug what is termed "a billion-dollar leak," it can, in the form of expendable anodes, go far toward mitigating the effect of corrosion and reducing its vast cost.

Teredo Studied

In the battle against corrosion, Dr. W. F. Clapp, director of the W. F. Clapp Laboratories, and a consultant on marine biology for the Sea-Air Corrosion Testing Station at Kure Beach, explained that the teredo, a mollusk which drills into wood and other materials, and which has been

MOBAR

Offers you a MUD WEIGHTING material that is:

1. A NATURAL BARITE ORE—No chemical treatment.
2. A CONSISTENTLY HIGH SPECIFIC GRAVITY—4.25 Plus.
3. A FINE GROUND BALL MILL PRODUCTS—95% to 97% Minus 325 mesh.

Missouri Barite has been used as weight material in drilling muds for oil and gas well drilling for over 20 years.

Mobar is the Natural Ore as taken from the ground. There has been no chemical treatment in it's processing and the finished product retains it's naturally inert characteristics.

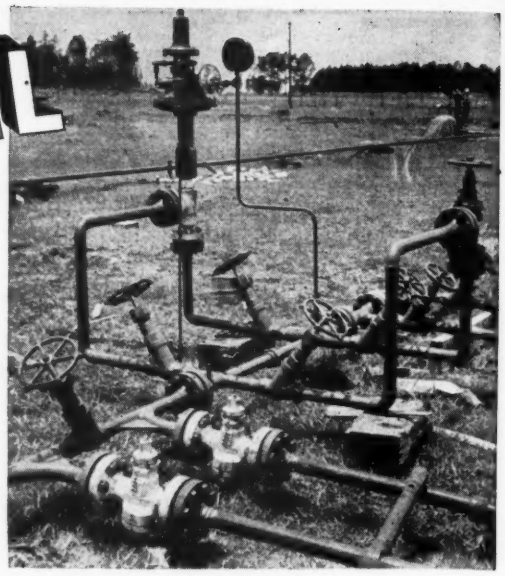
Telephone — Wire — Write

MOBAR CORPORATION

MINERAL POINT, MISSOURI
Phone 5804 R

FORGED STEEL

GLOBE VALVES
GATE VALVES
SCREWED FITTINGS
FLANGES•TUBE-TURNS



For over 20 years, we have **specialized** in furnishing **forged steel** to the Oil Country. As a result, we can furnish all departments of the oil industry with the most complete service for their needs when the call is for FORGED STEEL.

Just a look at the materials we **stock** will convince you that when you need FORGED STEEL, you'll want to get in touch with MAINTENANCE, specialists in that field able to fill your every requirement.

EDWARD VALVES, INC.
Forged Steel Globe, Angle, Needle and Check Valves; Cast Steel Gate and Globe Valves.

TUBE-TURNS, INCORPORATED
Seamless Steel Welding Fittings. Forged Steel Flanges.

BONNEY FORGE & TOOL WORKS
Thredolets and Weldolets.

MASON-NEILAN REGULATOR COMPANY
High Pressure Gas Regulators.

HENRY VOGT MACHINE COMPANY
Forged Steel Globe and Gate Valves. Forged Steel Ells, Tees, Street Ells, Crosses, Plugs, Bushings, Caps, Unions and Flanges.

NORDSTROM VALVE DIVISION, ROCKWELL MANUFACTURING CO.
Plug Valves.

MAINTENANCE ENGINEERING CORPORATION

EQUIPMENT WITH ENGINEERING SERVICE

3611 CLINTON DRIVE
P. O. BOX 2637,
HOUSTON 1, TEXAS
P-3135
L. D. 409

MECO

known for centuries to mariners as the ship worm, is coming in for more extensive attention. The destructive characteristics of the teredo can possibly be best expressed from evidence that when teredoes recently bored into wooden pilings in a Long Island wharf that they so weakened the structure that it collapsed within 18 months after completion. Teredoes reportedly are present in all waters but are worse in some sections than others.

Some species of teredo are capable of drilling through wood at the rate of an inch a week. In 2 months they may construct tunnels 8 or 10 in. long. And when present in large numbers, which is usually the case, they occasionally completely destroy large pilings 12 or more inches in diameter in 3 months. They spawn at the rate of millions per season and apparently are unaffected by many toxic poisons which may be introduced in wood or water. Dr. Clapp explained that tunneling in wood is for protection, not for food. Close relatives of the teredo form similar tunnels in marble, shale or poor concrete for the same purpose.

Waxes Submerged

Solid blocks of various types of paraffins and waxes are submerged at Kure Beach in order to determine into just what materials the ship worm, or teredo, can drill. At present, coal tar creosote is the only known preservative of any value in permanently combating the destructive teredo. And this is not due to the toxicity of this preservative, but rather to the fact that it renders the very minute cutting teeth of the teredo relatively ineffective. The teeth of this type mollusk have a remarkable quality in that when worn down by arduous drilling the marine animal can grow a new set within a very few hours.

The preservative effects of creosote on different types of woods is now being tested on a large scale. One of the greatest problems, Clapp explained, is to find a solvent with which to mix coal tar creosote so that it will do the most effective job of penetration.

More Storage Facilities Planned in Minnesota

ST. PAUL, Minn.—Twelve storage tanks with a total capacity of 400,000 bbl. of petroleum products will be erected here in the near future by W. H. Barber Co., Minneapolis.

W. L. Holmgren, company president, said the tanks will range from 8,000 to 80,000 bbl. in capacity and will provide a substantial increase in storage facilities for the Minneapolis-St. Paul area. Holmgren said his company distributed 3,000,000 bbl. of fuel oil in the area last year.

MULTI-VALVE--
WONDER VALVE!

Yes . . . a wonder valve. For the LUDLOW Multi-Valve gives throttling action and positive shut-off with reliable and long-lived performance!

Accurate throttling action results from an ingenious multi-staging of the cone-shaped plug by which pressure is reduced step by step in a series of annular expansion chambers. Positive shut-off is assured through the multi-contact lands seating firmly against the converging walls of the seat. Cone is mounted rigidly on a non-revolving stem that operates with a straight push-pull action . . . gives longer packing life. The valve requires no regrinding.

LUDLOW Multi-Valves are built to meet modern needs. Write for Bulletin 103.

The LUDLOW VALVE
SINCE 1866
MFG·CO·INC·TROY·N·Y·

WISCONSIN Air-Cooled ENGINES
RUN Whether the Weather is WITH you or AGIN' You!

This typical Wisconsin-powered pipe line installation, doing duty in Oklahoma, is out in the open, exposed to all kinds of weather at all seasons. And that's where Wisconsin Heavy-Duty Air-Cooled Engines demonstrate their true worth, year in, year out. Weather-sealed, rotary type high tension outside magneto, equipped with impulse coupling, assures positive firing and quick, easy starting in any weather. High efficiency air cooling eliminates cooling chores and troubles. Heavy-duty serviceability reduces layups and maintenance costs to a minimum.

WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
510 Atlas Building, Tulsa, Oklahoma
M & M Building, Houston, Texas
Oil field distributors for Wisconsin Engines and all types of utility units.

HOLDING UP THE offshore DRILLING RIG

by E. H. Short Jr.

AT the present time there are approximately 1,775,000 acres of water bottoms, extending out to the 27-mile limit, under lease off the coast of Louisiana between the Texas-Louisiana boundary and the Mississippi delta. That 1947 will mark the beginning of extensive exploration and exploitation drilling is indicated by the fact that, in addition to the two Magnolia Petroleum Co. wells now drilling at distant points offshore south and southwest of Atchafalaya Bay, seven other major oil operators will probably start drilling operations during the next few months.

Within the past 4 years oil companies have conducted extensive seismic surveys at distant points out in the Gulf of Mexico. During this time, when seismic fleets were prowling some 25 or 30 miles offshore, most operators had not even assigned to engineers the problem of conducting drilling operations in this new territory, if and when likely areas were spotted by geophysicists.

However, during the past few months special offshore research units have been set up in various companies and engineers have been shoved into high gear to provide as quickly as possible, platforms with sufficient strength safely to meet the maximum stresses imposed by waves and wind under hurricane conditions; high enough to protect equipment against wave action; and large enough to accommodate adequate supplies and the personnel.

Economic Studies Completed

In addition to the research work being conducted on the mechanical phase of the offshore drilling problem, within recent months engineers have completed economic studies which indicate the feasibility of these offshore drilling projects. Obviously the first few platforms will be the most expensive. One company has indicated that a proposed piling platform will cost in the neighborhood of a million dollars. The cash outlay and operating cost of the craft necessary for this type of operation is expected to be tremendous, as compared with inland bay and swamp drilling.

However, geophysicists and geologists who have been closely connected with offshore survey activities are of the opinion that production possibilities out in the Gulf of Mexico should have somewhat the same reservoir characteristics as those fields which have been producing for some time in coastal Louisiana.

Lake Barre field off the coast of Terrebonne Parish, Louisiana, for example, has produced over 15 million barrels of oil. Drilling was commenced in 1929 and has been gradually under way up to the present time. Production is coming from the Upper Miocene from 20 wells ranging in depth from 3,645 to 11,772 ft. Another example of possibilities is Lake Pelto field. Cumulative production from this field has been around 40 million barrels. There are 22 wells producing from the Upper Miocene from depths ranging from 5,000 ft. to 11,300 ft. The yearly production from these wells now runs over 2 million barrels.

The first offshore-proper field was Superior-Pure Creole field a mile off shore near Cameron, La. Cumulative production has amounted to over 2½ million barrels from seven wells which are still producing at a yearly rate of over 155,000 bbl.

Grand Bay field, Gulf Refining Co., extending from that part of Plaquemines Parish lying on the east side of the Mississippi River into the Mari-

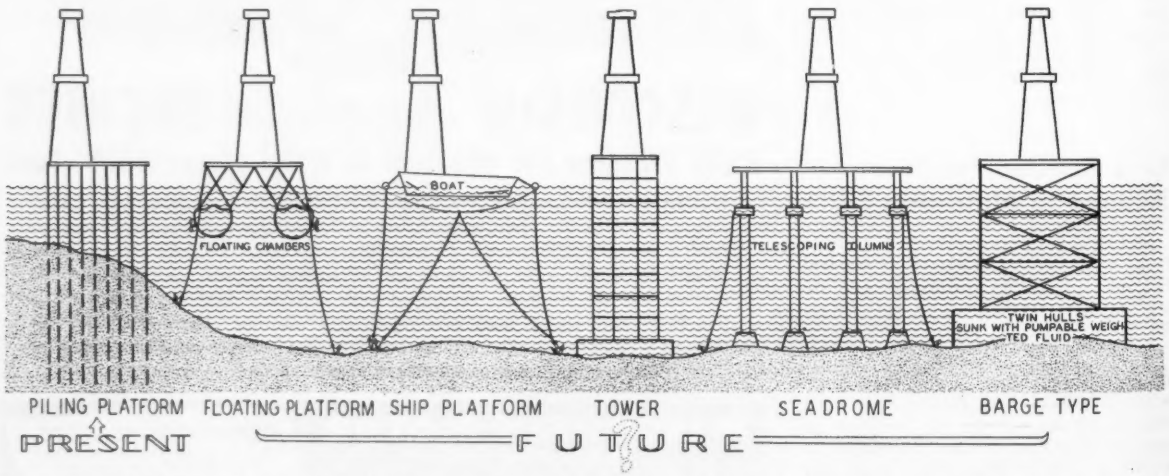


Fig. 1—Generalized proposed types of foundations for support of drilling rigs at offshore locations in the Gulf of Mexico along the Continental shelf of Texas and Louisiana

Multi-Metal

Wire Cloth
Filter Cloth
All Meshes
All Metals

FABRICATED WIRE CLOTH

For more than 34 years Multi-Metal has designed and fabricated an infinite variety of filter units which involve the use of wire cloth. Multi-Metal stresses its technical facility. In addition to our fabrication plant, we carry a wide variety of wire cloth which is available by the roll and cut piece. Write for our new catalog and free wire cloth samples.

Multi-Metal
WIRE CLOTH COMPANY, INC.
1350 Garrison Ave., New York 59, N. Y.

ORIFICE METER CHART COMPUTING SERVICE

Our 20 years' experience in gas measurement to obtain ultimate results from orifice meter charts is available to large and small operators—*seven days a week.* Reduce chart reading expenses with this proven service combining accuracy, speed, and economy.

COMPUTATION BY INTEGRATOR

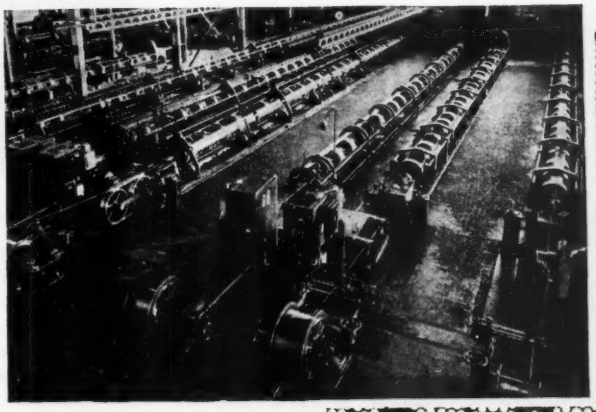
SPECIALIZED CHART AUDITING

FIELD AND SHOP OVERHAUL OF ORIFICE METERS

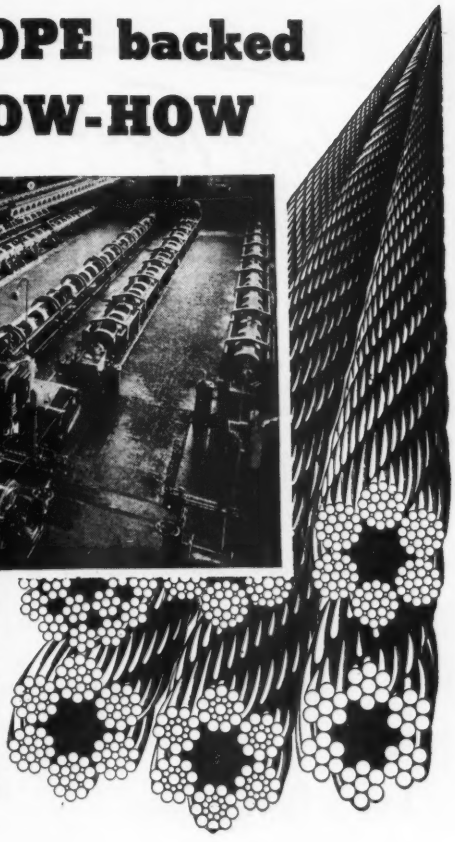
For detailed information write

JOHN P. SQUIER
GAS MEASUREMENT ENGINEERING SERVICE
P. O. BOX 6100 DALLAS, TEXAS

Buy the ROPE backed by the KNOW-HOW



Here are a few of the stranding machines in Wickwire Spencer's modern wire rope mill. In principle, these machines are not unlike those found in many rope mills. The difference—the thing that makes Wickwire Rope longer lasting—lies in the making of the steel and drawing of the wire used in the rope.



Only steel wire with the highest possible degree of perfection in hardness, strength, toughness and fatigue-resistance is used. And every wire used in making Wickwire Rope is drawn until it's accurate within a fraction of a thousandth of an inch.

Distributors and Wickwire Rope engineers in all parts of the country are prepared to render prompt service in solving your wire rope problems and meeting your wire rope needs. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.

VALUABLE GUIDE FOR ALL ROPE USERS—Thousands of wire rope users have found that the information packed in the 82 pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. This easy-to-read, profusely illustrated manual is free. For your copy write, Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.

WICKWIRE ROPE
A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

CF&I & SUBSIDIARIES

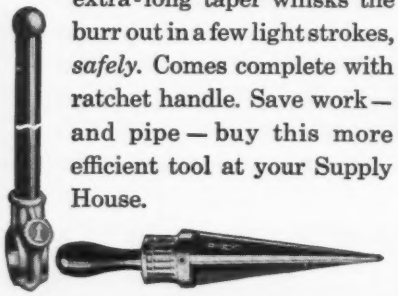
WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass.
GENERAL OFFICE—500 Fifth Avenue, New York 18, New York
SALES OFFICES—Abilene (Tex.) • Boston • Chattanooga • Chicago • Denver • Detroit Philadelphia • Tulsa • Fort Worth • Houston • Newport News • New York
PACIFIC COAST—The California Wire Cloth Corporation, Oakland 6, California

Long-Tapered

FOR SAFE, QUICK PIPE REAMING

Extra-long-taper RIDGID takes work and risk out of pipe reaming

● No thinning of pipe or conduit, no flaring or splitting it, even when you ream it extra fast—as this RIDGID encourages you to do. That extra-long taper whisks the burr out in a few light strokes, *safely.* Comes complete with ratchet handle. Save work—and pipe—buy this more efficient tool at your Supply House.



Reamer unit sold alone for use in RIDGID *No. 00R Ratchet Threader handle.*

RIDGID

WORK-SAVER PIPE TOOLS

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

G-1-5 MOTOR-OPERATED GAS VALVES

With Damper Control

The most powerful Hydramotor Gas Valve of its size ever designed. Has ample damper power for louvres or secondary air doors. Handles natural, manufactured or L. P. gases. Sealed in oil for life. Motor driven hydraulic pump compounds high operating force. No gears to wear or lock. Simplicity and minimum friction insure extra years of life. Opens, 8 to 10 seconds. Closes, 2 to 3 seconds. Sizes, ¾" to 2½" I. P. S. Low or line voltage, all frequencies. For all kinds of industrial applications.

Request New 1946 Catalog 52C

GENERAL CONTROLS

801 ALLEN AVENUE — GLENDALE 1, CALIF.

FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO
KANSAS CITY • NEW YORK • DALLAS • DENVER • DETROIT • CLEVELAND
HOUSTON • SAN FRANCISCO • SEATTLE • PITTSBURGH
DISTRIBUTORS IN PRINCIPAL CITIES

"I'll take the WHITE one every time!"

WYTEFACE "A"
Trade Mark
Steel Tapes for the Oil Industry

WYTEFACE "A" Steel Tapes have raised black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Designed for hard service. Resist rust and corrosion. Raised rims and markings protect the white background from abrasion from rails, pipe, rocks, concrete. Made in styles especially for Oil Riggers, Oil Gaugers and for general measurements. See your supply house, or write for details to Keuffel & Esser Co., Hoboken, New Jersey.

K+E

Drafting, Reproduction, Surveying Equipment and Materials. Slide Rules, Measuring Tapes.

KEUFFEL & ESSER CO.
EST. 1867
NEW YORK • HOBOKEN, N. J.
Chicago • Detroit • Los Angeles
St. Louis • San Francisco • Montreal

time Belt of the Gulf of Mexico has produced around 15 million barrels and has a reserve of approximately 18 million barrels. There are 19 wells in this field producing from the Upper Miocene sand at depths ranging from 6,000 to 10,000 ft. Drilling was begun in 1939, and the field is still producing at the rate of approximately 3 million barrels per year.

Other fields which illustrate the important possibilities are: Caillou Island field off the coast south of Houma, La., which has produced over 39 million barrels and has a reserve of about 20 million barrels; Paradis field which has produced over 15 million barrels and has a reserve of 55 million barrels; and Bayou Sale field which has produced over 9 million barrels and has a reserve of 41 million barrels.

While the fields which might be discovered in distant offshore water bottoms may not all have such potential possibilities as those close-in or shore fields just mentioned, the possibilities appear sufficiently attractive to justify the substantial expenditures which will be necessary adequately to hold up the offshore drilling rig.

As to the mechanical phase of the offshore drilling problem, it has been rather obvious in engineering circles, since the offshore drilling problem was presented for a comparatively quick solution, that piling platform would be used. Submersible barges have never been designed for operation in greater depths than 15 ft., and even though the depth of water at distant points in the gulf does not exceed this depth, the stability afforded by water ballast could not be expected to hold a barge in place under the current and hurricane conditions which exist in unprotected portions of the gulf. The wind stresses imposed by an immense hurricane might amount to around 54 lb. per sq. ft.; however, the resulting wave action might impart stresses to offshore drilling platforms amounting to anywhere from 2,000 to 5,000 lb. per sq. ft.

Considerable Depth Data

Fig. 2 shows the shoals and depth of water in the scene of leasing activity along the Louisiana coast. The dotted line represents the approximate 27-mile limit, although seismic crews have ranged far beyond this point. The soundings in fathoms were compiled from charts issued by the U. S. Coast and Geodetic Survey. From the shore line the sea bottom slopes 5 or 6 ft. per mile for about 60 miles, or to the 50-fathom contour. The soundings shown on the map vary in distance apart from 6 to 21 miles. Seismic crews, however, have accumulated considerable depth data at closely spaced intervals. Leases, therefore, which might appear to be in water even exceeding 100 ft. in depth from this rather general depth map, may actually be on shoal where the water is much shallower, probably not exceeding 40 or 50 ft. A shoal area, extending to the 27-mile point south of Vermilion Bay, is heavily leased, and also the shoal area extending westward from Terrebonne Bay to the area south of Atchafalaya Bay. Water bottoms in the 27-mile area vary from sticky mud to hard gray shale.

According to engineers assigned to the offshore platform problem, no textbook formula pertaining to marine structures quite fits the problem at hand. So it is necessary to introduce a correction factor based altogether upon a profound respect for the stress conditions which might exist under extreme conditions in the Gulf of Mexico. For this reason, and until the accumulation of empirical data lends dependable accuracy to calculations, offshore structures will be long on the safety-factor side and perhaps short on the economy side.

The present work being conducted by various company marine research units has involved the careful consideration of all plans for offshore drilling, submitted by outside inventors who do not appear to be very well informed on the problem as it

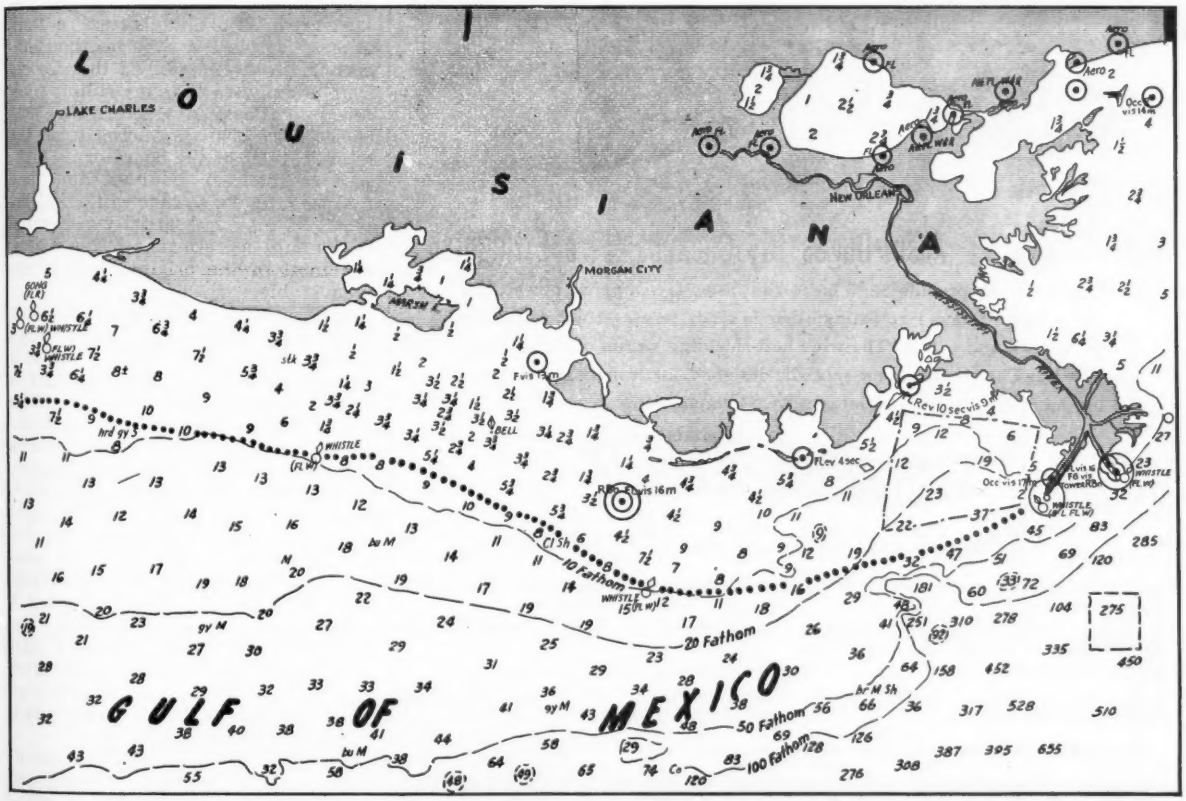


Fig. 2—U. S. Coast and Geodetic Survey map showing depths in fathoms of water of the Continental shelf within the 27-nautical-mile zone off the Louisiana Coast

53% More Fire-Fighting Power

with the NEW Ansul-Dugas Dry Chemical Fire Extinguisher

Engineered to provide 53% more and faster fire-stopping power, the NEW Ansul-Dugas Fire Extinguisher is ready to use—IN A FLASH—on Class B and C fires. The wide heat-shielding stream of Ansul Plus-Fifty Dry Chemical from the specially designed nozzle makes extinguishing more certain even by inexperienced employees.

STOP FASTER!

HERE ARE OTHER PLUS FEATURES

- Quicker, easier, on-the-spot recharge right after use.
- Highest Rating for SPEED and EFFECTIVENESS as determined by impartial authority.*
- New, wider coverage type nozzle with long range effectiveness.
- Greater fire-fighting power pound for pound, dollar for dollar.
- Increased fire-fighting capacity without increased weight.
- Engineered to resist corrosion.
- Ansul Plus-Fifty Dry Chemical is non-toxic, non-abrasive, non-corrosive.

*Write for charts based on authoritative data of comparative ratings as determined by a national approval agency.

ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

pertains to drilling operations. These ideas have been presented in various engineering society publications and republished in other magazines; and since none of the ideas has a great deal of practical merit, a further rehash in this article is not justified. It has been observed by many company engineers that most of the outside proposals for offshore drilling seemed to be imbued with the idea that to drill in water from 200 ft. to over 600 ft. in depth is the important problem facing operators at the moment, and that the small matter of economics will automatically take care of itself. Some of these plans also attach no greater mechanical significance to the fastening of cables in the ocean floor at great depths than a roustabout would give to the simple task of driving of a stake on a lease.

At the present time, judging from the leasing activity off the coast of Louisiana in the 27-mile zone, operators are confronted with the problem of drilling in comparatively shallow water, perhaps not over a hundred feet in depth. However, the deepest operation planned during this year will be in approximately 50 ft. of water. This platform will be about 90 ft. above the floor of the ocean.

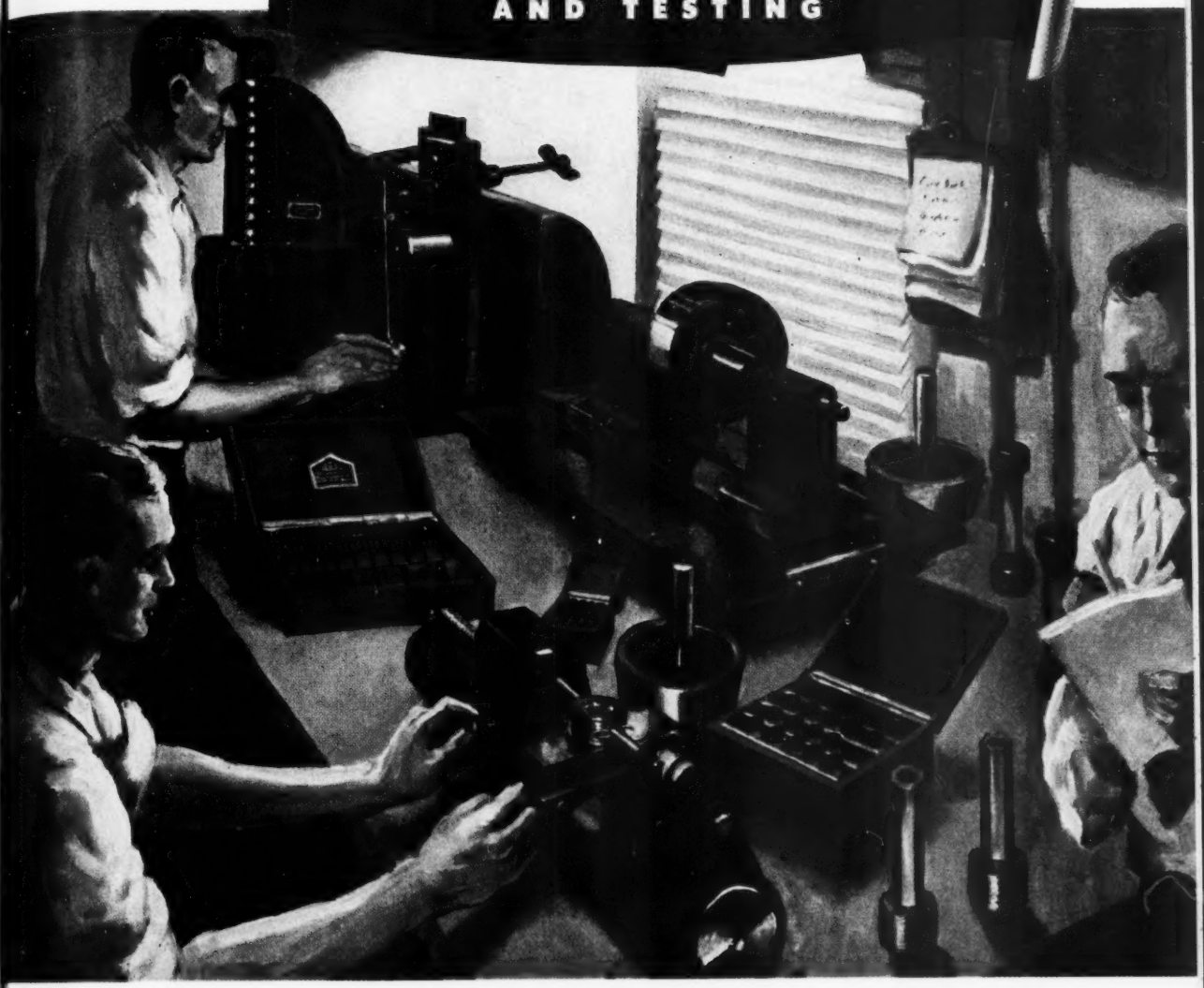
Disadvantages of Method

Despite the fact that it has been expedient to adapt proven, close-to-shore piling platform plans to distant offshore drilling structures, engineers agree that the method has certain disadvantages. At the present time it appears that a drilling platform might cost anywhere from $300,000 to $1,000,000, depending upon the specifications of the operator. A large part of the cost involves labor and the use of craft; so that while a piling platform may be partially recovered if drilling operations are unsuccessful, most of the original cost is unrecoverable.

The driving of piling is not only hazardous at times, but becomes altogether impossible under adverse weather conditions. Since weather is the determining factor, it is almost impossible to predict, with any degree of accuracy, the completion date of a piling platform once it is started. Pile driving on the Magnolia platform south of Point Au Fer, just outside of Atchafalaya Bay, was begun on May 28. It was ready for moving on drilling equipment and rigging-up operations on August 7—after a construction period of 72 days. The first work on Magnolia's second platform (which is close to 30 miles from the nearest land) was begun during the latter part of 1946 and completed about a month ago.

Another obvious disadvantage of the piling platform is its permanence. For exploratory work the cost of deflecting wells at great distances (in the event the piling platform was not

MISSION *Precision* INSPECTION
AND TESTING



MISSION'S INSPECTION DEPARTMENT IS RESPONSIBLE ONLY TO MANAGEMENT

This policy is rigidly enforced by a management broad enough to see that a little extra profit today is bad business if it means that a customer will get a Mission product that is not up to Mission standards in every way.

The high standard of Mission quality must be maintained. Every steel must be right. Every assembly must be dependable. To this end hundreds of accurate production, inspection, and master gauges are used by inspectors responsible only to management.

This policy assures Mission customers the world over of getting uniformity in quality and dimension, and perfect fit and interchangeability on the lease.

AD NO. 5 OF A SERIES

1. Mission Research
2. Mission Engineering
3. Mission Metallurgy
4. Mission Manufacturing
5. Mission Inspection
6. Mission Service
7. Dependable performance
8. No substitute for experience
9. It takes time to develop dependable products
10. Perfection demands indomitable persistence in research
11. To produce the finest that research can develop
12. Working together

Mission MM
MANUFACTURING CO.

Examples of
MISSION PRECISION
Inspection and Testing

Checking the taper
ON MISSION VALVES AND PISTONS

All slush pump valves and pistons depend on a tapered, metal to metal seal to hold the highest pressures the pump can develop. For pistons it is the joint between the piston and rod and for valves, it is where the tapered valve seat fits into the pump deck. A minor inaccuracy of these sealing surfaces can result in leakage and serious cutouts.

To reduce the danger of cutouts, Mission's inspectors check the diameter, taper, hardness and surface finish of Mission piston bodies and valve seats. They reject *every* part that fails to meet their exacting requirements.

That's why cutouts are rare when Mission pump parts are used and it is just one of the many reasons why Mission valves and pistons are the choice of leading operators — the world over.

SOLD THROUGH
SUPPLY STORES EVERYWHERE

EXPORT OFFICE: Room 1636, 30 Rockefeller Plaza, New York 20, N. Y.

Mission
MANUFACTURING CO.
HOUSTON, TEXAS

MISSION SLUSH PUMP VALVES • MISSION FLUID END PISTONS • MISSION PISTON RODS
MISSION GLAND PACKINGS • MISSION SLIPS • MISSION SWABS • MISSION PLUG VALVES

located near the most likely subsurface possibility) might result in substantial expenditures. On the other hand, the piling platform, from which several wells may be drilled, should prove quite economical when figured on a cost-per-well basis where exploitation drilling is involved.

Engineers are of the opinion that improvements in offshore drilling platforms will progress from time-proven methods such as the piling platform, or adaptation of the submersible barge. The possibility that any of the highly imaginative inventions proposed by outside inventors will enable operators now drilling in comparatively shallow waters suddenly to jump out to areas where the water may be 200 ft. to over 600 ft., is as remote from acceptance as plans for the design of a 15,000-ft. drilling rig would have been in the days when 1,500-ft. wells were considered deep.

Barge Adaptations Studied

Plans are being studied for adapting the barge to deeper drilling operations. The deepest barge operation yet to be made on the Gulf Coast is that of Salt Dome Oil Corp. whose barge is designed to operate in 15 ft. of water.

There are vast areas within the 27-mile zone off the coast of Louisiana where the water does not exceed 18 ft. in depth, and the recoverability feature of a barge-drilling platform has some attractive economic possibilities. Present plans involve the twin-hull design, much longer and wider than ever used, but having conventional height. If the design is successful, the superstructure (with a platform on top) would afford the necessary height above wave action under turbulent sea conditions. It is doubtful if such a structure (sunk with sea water) would withstand the strong currents and hurricane conditions which might be encountered at distant points offshore. The sinking of a barge-type drilling platform with a weighted fluid which will retain pumpable qualities indefinitely has been considered by one major operator. It is possible that this method of imparting stability may offer a practical means of adapting the barge-type platform to distant offshore drilling operations.

BOOKS

PRACTICAL EMULSIONS. By H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court Street, Brooklyn. 568 pp. $8.50.

This completely revised and enlarged edition contains additional matter on partial fatty acid esters of polyhydric alcohols, as well as their application in food products. Special sections have been added on the use of soap, lecithin, and pectin as emulsifying agents, and on surface-active germicides. A symposium on industrial emulsions has also been included. This covers the use of emulsions in leather treatment, dyeing and coloring, synthetic latex, polishes, cosmetics, paints, etc. The most recently developed emulsion formulas have been added to the formula section. The comprehensive list of emulsifying agents will be of value to chemists, technologists, manufacturers, and students in many fields of research and industry.

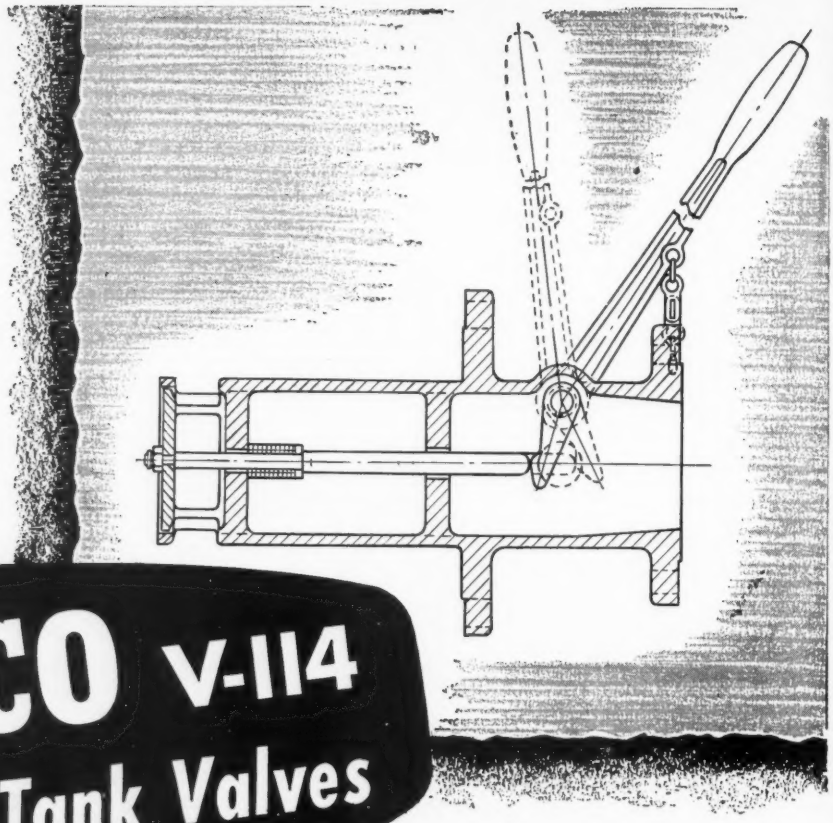
SPECIAL STUDIES OF RESERVOIR OILS IN NAVAL PETROLEUM RESERVE NO. 1, ELK HILLS FIELD, CALIFORNIA. Prepared by U. S. Bureau of Mines, Department of the Interior, Washington, D. C. 60 pp. Free.

This report, used by the Navy along with information previously obtained to calculate reservoir performance and oil reserves, is a representative view of the physical properties of reservoir oils in the partly depleted shallow zone of Elk Hills field. In addition, it reports a new method for obtaining produced oil samples from pumping wells that minimizes the effect of daily and seasonal variations in temperature on their gravities. Four wells in different areas of the field were sampled to obtain subsurface oil representative of the wide range in gravity. Procedures employed in obtaining and recombining casing-head gas samples with subsurface oil samples are presented in the report, which also includes detailed charts, graphs, and laboratory determinations.

NATURAL GAS AND THE PUBLIC INTEREST. By Frederick F. Blachly and Miriam E. Oatman. Published by Granite Press, 1025 Connecticut Avenue, N. W., Washington, D. C. 159 pp. $1.

This is a short economic review of the natural-gas industry, and a history of legislation that has been introduced regarding its control, conservation, regulation, and transportation.

ADSCO
HEAT EXCHANGERS
STRAIGHT TUBE AND U-TUBE TYPES
Wherever industrial processes involve heating and cooling of liquids, ADSCO provides a complete line of horizontal and vertical heat exchangers. Available in a wide range of sizes built to standard and custom requirements and fabricated with ferrous and non-ferrous alloys. ADSCO engineers are at your service to aid in selecting or designing heat exchangers to meet your needs.
Write for Bulletin 35-76
ADSCO
AMERICAN DISTRICT STEAM CO.
N. TONAWANDA, N. Y.



OCECO V-114 Internal Tank Valves

close automatically when exposed to fire

● Oceco V-114 Internal Tank Valves have been designed specially for use when fire regulations require that tanks holding combustible liquids be equipped with valves that will close automatically when subjected to exposure fires.

The valve is held open with a lever and a fusible link which melts at 165°F, releasing the lever, and permitting the spring to seat the valve tightly—shutting off the liquid flow. A boss on the side of the valve body can be drilled and tapped for a by-pass connection, to permit easy operation of the lever when tank pressures are excessive.

Oceco V-114 Valves are available in 3", 4", 6" and 8" sizes. The 3" size with screw thread can be mounted within a tank flange. The 3", 4", 6" and 8" flanged valves—see diagram above—can be mounted respectively inside 4", 6", 8" or 10" standard A.P.I. tank nozzles or nozzles constructed of extra heavy pipe. All sizes of the valves extend at least 1" inside the tank shell, and consequently are free flowing under all conditions.

Complete specifications including price and size data sent promptly on request. Write for full details today.

OCECO

Division of THE JOHNSTON & JENNINGS CO.

CLEVELAND 14, OHIO

NEW YORK • PITTSBURGH • DETROIT • CHICAGO • ST. LOUIS • TULSA • BEAUMONT
MOBILE • CASPER • SAN FRANCISCO • LOS ANGELES • TORONTO AND MONTREAL

Effect of Oil on

Plastic Properties of Petroleum Waxes

And Development of Plasticity Tests

by W. L. Nelson* and L. D. Stewart†

MANUFACTURERS of microcrystalline petroleum waxes have been slow to adopt standard test methods and specifications. More than 100 general uses for waxes have been developed, and in order to differentiate between waxes and write specifications for their uses many types of test methods must be recognized. The testing of paraffin wax usually involves such tests as odor, taste, melting point, color, penetration, and tensile strength. With the development of microcrystalline-type waxes testing methods became more complex.

The behavior of 30 blends of technical white oil with 3 typical waxes is herein described. Each blend was tested with respect to eight significant properties. Several test methods had to be devised since adequate methods have not heretofore been described. The three waxes used for blending with oil were: (1) Fully refined paraffin, 128° m.p.; (2) microcrystalline tank-bottom wax, brown 170°-175° m.p.; and (3) high-melt semicrystalline tank-bottom wax, white 190°-195° m.p. The experimental results indicate properties of these blends as follows:

Solid point is defined as the temperature at which a liquid droplet goes solid on the bulb of a rotating thermometer. Since plastic waxes form an intimate mixture with oil, the drop in solid point resulting from the addition of oil is greater than is the case with less plastic waxes. For example, the solid point of a white wax of 170°-175° m.p. will drop 15°, whereas a black oil of the same melting point would drop 16°. A less-plastic, high-melt wax, as W190-195, only drops 13° for the same amount of oil added.

Penetration.—The A.S.T.M. needle penetration was used. A single penetration value is no indication of the plasticity of a wax, but the slope of the penetration curve with the addition of oil is a sensitive indication of the difference in plasticity of two similar waxes, the more plastic giving the steeper curve.

Percentage contraction.—This test involves determining the melting point of a wax and measuring the percentage contraction from 10° F. above to 50° F. below its melting point. Crystalline waxes suffer a greater contraction on solidification due to the formation of crystals than microcrystalline waxes. Experimental results show that the contraction decrease linearly with addition of oil regardless of the type of wax tested. Other tests indicate that no plasticity is imparted to the paraffin wax by the addition of oil, and therefore plasticity depends upon something more than just crystal structure.

Plastic point.—The plastic point is herein defined as the lowest temperature at which a standard strip of waxed paper will bend without showing visible cracks. The addition of oil rapidly decreases the plastic point of the microcrystalline and semicrystalline waxes, but does not appreciably alter the plastic point of paraffin (macrocrystalline) wax. Since plastic waxes will bend at temperatures much lower than their melting points, the difference between the melting point and the plastic point indicates the degree of plasticity of waxes.

Ductility.—This property was determined by measuring the distance in centimeters that a briquet specimen will elongate before breaking. Ductility is little affected by the addition of oil. Upon addition of oil, no ductility is imparted to paraffin wax (at 77° F.), but the inherent ductility of the plastic waxes increases slightly to a maximum, after which it decreases to below the original ductility.

Tensile strength is a measure of the force, in pounds per square inch, required to break a briquet specimen when elongated. In the study of plasticity, tensile strength of itself did not appear to be significant (other than to indicate a decrease with the addition of oil), but when used in conjunction with compressive strength it is related to plasticity, as indicated later.

Compressive strength is herein defined as the force, in pounds per square inch, required to cause flow when a wax specimen is compressed. Rheologically, plastic materials require a pressure of some magnitude before displacement takes place, while liquids are displaced by a differential pressure. The magnitude of the pressure required to cause flow in a plastic material is then a measure of its plasticity, by the rheological definition. The authors believe that a compressive strength test can be used to replace other flow-type tests, such as pressure viscosity, in determining the plasticity of waxes. The significant result of our studies is that the more plastic a wax is, the more closely the comprehensive strength approaches the tensile strength. Advantages of a compressive strength test are that the test is always reproducible since the whole specimen is tested rather than just the weakest point as in the tensile strength test, and waxes of widely varying strengths can be tested by increasing or decreasing the area of wax subjected to the test.

Flexibility is defined as the number of times a stick of wax can be bent before breaking. Additions of oil to plastic waxes cause an increase in the flexibility up to a certain point, but oil does not impart flexibility to paraffin waxes. This test subjects the wax to both tension and compression, and the "fatigue" that a wax can withstand is closely related to many service requirements. Flexibility is probably the most significant of the plastic properties, and is related to the plastic point and compressive strength.

In summary, the multiplicity of uses of petroleum waxes requires the blending of plastic waxes, crystalline waxes, oil, and plasticizing agents. Different blending agents enhance different properties, and thus a complete set of blending curves is required to indicate the usefulness of a wax. Thus petrolatum might be found to be half as effective as technical white oil in decreasing the plastic point or compressive strength but twice as effective in increasing the flexibility. Waxes and blending agents could thus be evaluated on a standard basis, but test methods similar to the ones used in this research need first to be recognized and standardized.

This article is an extended digest of a paper presented at the Petroleum Group Sessions at the Midwest regional meeting of the American Chemical Society, Kansas City, Mo., June 23-25. Other abstracts are presented starting on the next page.

*Technical editor, The Oil and Gas Journal, and head refinery engineering department, University of Tulsa. †Graduate student, University of Tulsa.

TO CARRY FULL LOAD

24 Hours Daily

...EVERY DAY

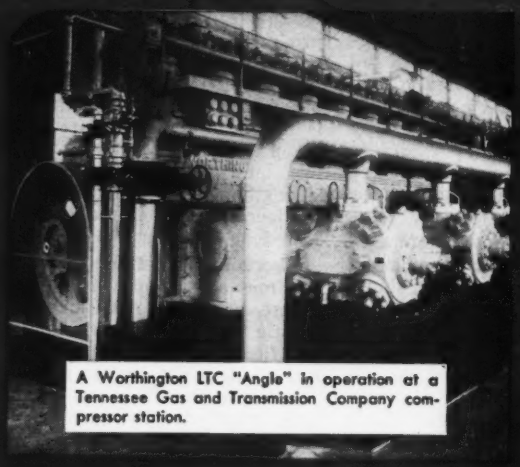
That's the job expected of the Worthington LTC Angle gas engine compressors on pipe line service everywhere.

Such certainty of profitable performance stems from Worthington's 107-year experience of keeping step with and contributing to the progress of industrial and utilities services during that period.

Furthermore, Worthington has spent these years in engineering, improving and manufacturing industrial equipment until, today, its LTC Angle Engine Compressors are recognized the world over for ruggedness and dependability . . . as demonstrated by their ability to carry full load . . . 24 hours a day . . . on natural gas transmission service.

Worthington Angle Engine Compressors come in four sizes of cylinder combinations from 400 hp to 1000 hp.

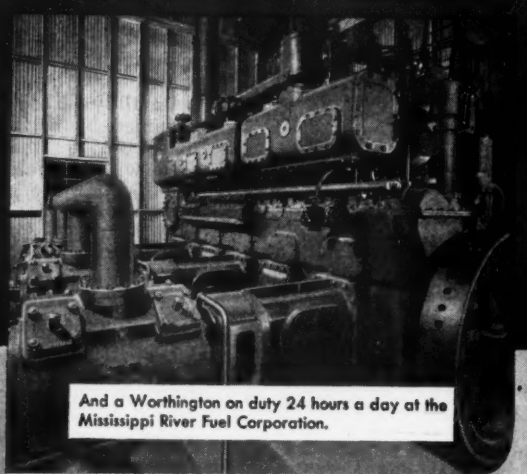
Write for illustrated Bulletin #L-690-B1 and see why *there's more worth in Worthington*. *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.*



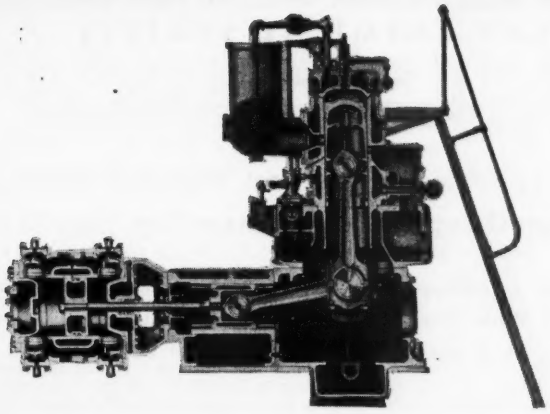
A Worthington LTC "Angle" in operation at a Tennessee Gas and Transmission Company compressor station.

Another Worthington earning its keep at the Lone Star Gas Company.

Worthington working efficiently at the Colorado Interstate Gas Company.



And a Worthington on duty 24 hours a day at the Mississippi River Fuel Corporation.

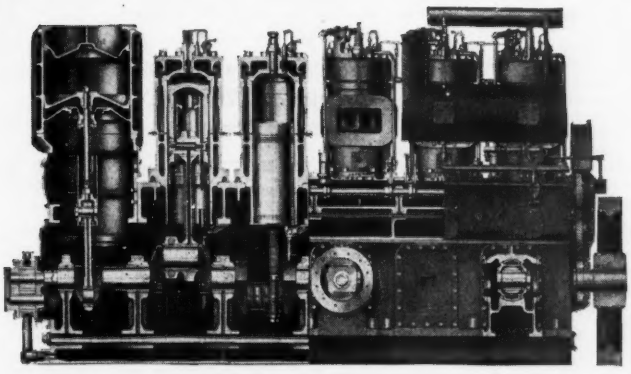


Angle Gas Engine Compressor

TYPE LTC

Oil Cooled Power Pistons

Vertical Straight-Line Power Cylinders



FOR REFRIGERATING PLANTS

For refrigerating plants in the refinery, chemical or industrial field, Worthington compressors are a natural choice.

Worthington's years of experience in engineering and manufacturing refrigerating plants have built a world-wide reputation for reliability and exactness.

FOR PROCESSING AND FIELD PRODUCTION PLANTS

Worthington LTC gas engine compressors, developed especially to meet the exacting requirements of the oil and gas industry, are also widely used in chemical or other processes where continuous operation and long compressor life are paramount necessities.

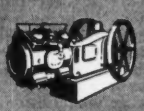
WORTHINGTON

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

Y-types

Vertical

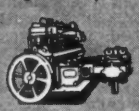
Horizontal



Portable

Radial

Gas-Engine Compressors



DIGESTS

AMERICAN CHEMICAL SOCIETY

Papers presented at Midwest Regional Meeting, Petroleum Group Sessions, Kansas City, June 23-25

Chemical Treatment of Drilling Muds Contaminated With Cement

R. W. JONES, Stanolind Oil & Gas Co., Tulsa.

NATURAL-CLAY drilling muds which have been heavily treated with sodium acid pyrophosphate have a much higher resistance to the adverse effects of cement contamination than when not so treated. This greater resistance is due to the presence of monosodium orthophosphate formed by reversion of the sodium acid pyrophosphate. Even though a considerable volume of mud may be lost or discarded during drilling, the remaining mud will contain relatively high concentrations of the residual orthophosphate, often as much as 0.85 lb. per barrel and more.

Consequently, laboratory investigations were made to determine the effectiveness of pretreatment of natural-clay drilling muds with monosodium orthophosphate. Cement contaminations studied ranged from 1 to 5 lb. per barrel; orthophosphate pretreatments ranged from 1 to 3 lb. per barrel.

Monosodium orthophosphate was found to be an effective pretreating agent for overcoming the adverse effects of cement contamination. For two natural, previously untreated Gulf Coast muds, pretreatment with 3 lb. per barrel of mud effectively counteracted the effects of contamination with as much as 5 lb. cement per barrel of mud, maintaining viscosity, water loss, and pH at close to original values. The same mud, without treatment, when subjected to the same contamination rapidly developed unworkable viscosities, high water loss, and high pH. For muds from inert clays, a pretreatment of 1 lb. per barrel was sufficient to maintain viscosity, water loss, and pH at approximately the original values if cement contamination was not over 3 lb. per barrel.

In general, pretreatment with monosodium orthophosphate was more effective than post-treatment with sodium acid pyrophosphate. Although the effects of comparable concentrations of both on the water loss and viscosity were similar, the pyrophosphate treatment did not maintain the pH at a satisfactorily low value.

Color Contamination of Petroleum Products Transported by Pipe Line

L. V. SORG and R. E. DICKEY.

A FIELD trial of an experimental alkaline inhibitor, designed to minimize internal corrosion in pipe lines transporting petroleum products, has been made. The use of this inhibitor was quite successful in reducing the amount of sediment removed from the pipe-line system. Its use, however, in the pipe-line system handling finished petroleum products, ranging from motor fuels to burning oils, gave rise to a most unexpected color-contamination problem, which was most noticeable and objectionable in the case of water white products such as kerosine. The dye responsible for this discoloration of water-white products was isolated and identified as p-indophenol. The dye is formed in the strongly alkaline corrosion-inhibitor phase and apparently results from a reaction between an oxidation product of the antioxidant used in motor fuels and phenol naturally occurring in petroleum stocks. These compounds are concentrated by the alkaline inhibitor phase. Concentrations of p-indophenol as low as one part in 5 million were found to impart an objectionable pink discoloration to water white petroleum products.

It was found that the addition of sodium sulfite to the corrosion inhibitor would eliminate the color difficulty without affecting the corrosion-inhibiting quality of the inhibitor.

Fuel Volatility and Distribution Correlation With EAD Curve Characteristics

CHARLES H. PRIEN and NORMAN A. PARKER,* University of Colorado, Boulder.

ALTHOUGH the effect of fuel volatility on general performance of an internal-combustion engine has been extensively studied, relatively few correlations have been secured between fuel properties and cylinder distribution. The authors report the result of an intensive study of fuel-air mixtures, ethylene dibromide, and tetraethyl lead distribution in an aviation engine operating at air temperatures between minus 40° F. and plus 34° F. Correlations are presented of individual cylinder distribution of the above three quantities, with the temperature and slope characteristics of the standard EAD curves of various aviation fuels. The effects of over-all fuel performance, and the separate effects of carburetor air temperature and power are analyzed, and related to the physical properties of the fuel.

*Present address, University of Illinois, Urbana.

Refining South American Crudes

DAVIS READ and GUSTAV EGLOFF, Universal Oil Products Co., Chicago.

SOUTH AMERICAN petroleums show the same variation in properties as North American oils and United States refining processes can be applied to them. Venezuela accounted for 85 per cent of South American crude production in 1946.

Stocks are prepared for thermal cracking by desalting and vacuum distillation. For fluid catalytic cracking vacuum flashing or propane deasphalting are best though viscosity breaking and thermal coking can be used.

Fluid catalytic cracking is used to produce motor fuel, aviation gasoline and synthetic-rubber bases. Thermal cracking of residual oils produces gasoline and bunker fuels. Thermal reforming improves octane numbers of naphthas and gasolines. Catalytic polymerization of olefins in cracked gases yields gasoline polymers or aviation fuel. Isobutane alkylation using sulfuric acid or hydrogen fluoride catalyst gives aviation gasoline or motor fuel. Gasolines can be dyed and inhibited for marketing.

Alumina Cracking Catalysts

V. M. STOWE, E. E. MARSHALL, L. L. NICKEL,* and R. S. GREENWOOD, Aluminum Research Laboratories, East St. Louis, Ill.

KEROSINE was cracked over activated bauxite, activated alumina, and alumina impregnated with compounds and magnesium, boron, silicon, and fluorine. Iron compounds in bauxites are deleterious, since they retard the formation of aromatic compounds, and use up the feed stock to produce gas and carbon deposit. Activated alumina, which contains practically no iron, gave better yields of higher quality gasoline than the best bauxites. Of the compounds added to the activated alumina, magnesia, chromium fluoride and zinc fluoride gave high yields of liquid olefins; magnesium fluoride gave gas of increased density; boric acid, ammonium fluoborate and fluosilicic acid gave high conversion rates. Best results were obtained with an activated alumina containing about 3 per cent silica.

*Deceased March 26, 1947.

The Use of Wetting Agents in Conjunction With Acid Inhibitors

P. H. CARDWELL and L. H. EILERS.

THE work reported in this paper covers the corrodibility of mild steel (A.S.T.M. A10-39) in various concentrations of hydrochloric acid solutions containing different inhibitors. Among the materials tested as inhibitors were a group of heterocyclic nitrogen compounds consisting of pyridine, and substituted pyridines such as the picolines, the lutidines, and the collidines; quinoline, and substituted quinolines such as quinaldine and lepidine; and acridine. Also tested were a group of compounds containing both nitrogen and sulfur. This group contained thiourea and symmetrically substituted diethyl, dibutyl, and diphenyl thioureas. It was found that these compounds varied greatly in their ability to protect the metal from corrosion. From the measure of the corrosiveness of hydrochloric acid solutions containing these nitrogen-base and the nitrogen-sulfur base inhibitors, it is evident that the size of the molecule is one of the important properties of an inhibitor. While there is no definite correlation between the size of the molecule and its inhibiting property, it can be stated in general that the larger the molecule the better the inhibitor it is. Since inhibitor compounds are adsorbed with the nitrogen, or sulfur oriented toward the metal, the projected area onto the metal of the molecule must be considered as its effective size. When a large molecule contains more than one nitrogen or sulfur atoms both atoms may be attracted to the metal and this will flatten the molecule along the surface of the metal and give greater protection.

Another factor which was found to affect the inhibition as given by the various inhibitors was the position of a substituted group within the molecule. It was found that in heterocyclic nitrogen compounds substitution of a methyl-group in the position ortho to the nitrogen gave a better inhibitor than substitution in the meta or para positions. Alpha picoline is more effective as an inhibitor than beta or gamma picoline or pyridine itself. Likewise, 2,6-dimethyl pyridine (2,6-lutidine) is more effective than 2,4-dimethyl pyridine (2,4-lutidine) as an inhibitor. This increase in the effectiveness of the material as an inhibitor as brought about by the substitution of a methyl-group para to the nitrogen is greater than can be explained from the increase in the size of the molecule. The presence of a substituted group ortho to the nitrogen may bring about an increase in the strength

of the adsorption bond between the nitrogen and the steel, which would result in a more effective inhibitor.

A third factor which affects the inhibiting property of an inhibitor is the ability of the material to be adsorbed at the liquid solid interface. Compounds which have a strong attraction for the acid solution will not be as positively adsorbed at the solid liquid interface as a material which has less attraction for the acid solution. It was found that when two similar compounds were tested as inhibitors, under the same conditions, the compound which has the greatest tendency to concentrate at an interface was the better inhibitor of the two.

Composition of Petroleum: Hydrocarbon Type Analyses Of 10 Distillates Boiling Between 100°-600° F.

W. C. HOLLIMAN and H. M. SMITH.

A COMPREHENSIVE study of the distillates from 10 of the more important crude oils of the United States, selected because their characteristics differed widely, was made during 1944-1946 by the Bureau of Mines to furnish information regarding sources of specific types of petroleum products. The 10 crude oils selected for this study represented major production in the following fields: Coles Levee and Midway-Sunset, in California; Louden, in Illinois; West Edmond, in Oklahoma; Bradford, in Pennsylvania; and Conroe, East Texas, Hastings, Slaughter, and Yates, in Texas.

The study included the design, construction, and use of special distillation apparatus which would provide large enough distillate fractions to permit the determination and comparison of many physical and chemical properties of the distillates not ordinarily made in the Bureau of Mines routine analysis. Detailed drawings of this special distillation apparatus are given in the report, together with a description of its operation.

An objective of the study was the development of computed functions, by a study of correlations between usually determined properties of the distillates and properties not ordinarily observed, that would amplify the applicable scope of the data obtained in the routine analysis and make it more useful in evaluating crude oils for specific and possible uses.

Superfractionation Study: Naphtha From Santa Barbara, Venezuela Crude Oil

F. G. SCHWARTZ, R. M. GOODING, and B. H. ECCLESTON.

THE relation of composition of 0.5 per cent fractions to their octane numbers, and the change in octane number of fractions as the distillation progresses is shown in this paper.

Approximately 100 gal. of a naphtha representing 22.12 per cent of a Santa Barbara, Venezuela, crude oil were superfractionated in a pilot-plant batch still having the equivalent to 80 to 90 theoretical plates. The fractions were collected between 103° and 326° F., hydrocarbon composition of each was determined by use of specific dispersion and refractivity intercept and F-2 (clear) and F-3 (+4.0 ml. TEL) octane numbers of each fraction were obtained.

A figure is presented in which three curves are shown; a conventional distillation curve, a plot of F-2 octane number vs. fraction number, and a plot of F-3 octane number vs. fraction number. The composition of each fraction in terms of paraffins, isoparaffins, naphthenes, and aromatics is given in a bar graph at the bottom of the figure.

From the composition and determined octane numbers the blending octane numbers of individual hydrocarbons was calculated. These values and several other physical properties are presented in tables which include:

1. Inspection properties of Santa Barbara naphtha.
2. Charge data for Santa Barbara superfractionation.
3. Composition of Santa Barbara naphtha (103°-326° F. boiling range).
4. Blending octane numbers of hydrocarbons. (From Santa Barbara and Oklahoma City superfractionations.)
5. Properties of isohexane, isoheptane, isooctane, isononane, and isodecane cuts from Santa Barbara naphtha.
6. Properties of isocuts blended with isopentane.
7. Composition of isocuts from Santa Barbara naphtha.
8. Calculated and determined octane numbers of isocuts from Santa Barbara naphtha.

Using blending octane numbers derived from this and preceding superfractionations, octane numbers of selected cuts may be calculated from laboratory superfractionations with an accuracy of ±3 octane numbers.

Special Applications of Absorption Spectroscopy

F. W. CRAWFORD and C. K. BUELL.

PURPOSE of this paper is to describe a number of specialized uses of absorption spectroscopy in the petroleum industry. The methods and procedures presented are not necessarily original with the authors, but all have been used to advantage by the authors and their associates.

Infrared absorption spectroscopy has been especially useful for conduction of surveys of the composition of the vapor throughout distillation columns. For example, a most satisfactory survey of a 100-plate column may be completed within 24 to 48 hours by two or three persons. Due to the economy of this method, columns operating under a variety of conditions may be studied in considerable detail. Often, as a result of the information gained, a method of column control can be worked out which involves a very simple short-cut analytical method. Several of these have been explained in this paper, and an example of column performance in which the control was based on such analyses has been given.

A practical analysis for total aromatic content of a stream sample which required only one extinction measurement was worked out. The total aromatic content for each of several samples was determined by the TIWC Referee Method No. 6AR-42, and these values were plotted against the extinctions of the respective samples at 6.15 microns. A working curve, quite satisfactory for the purpose, was obtained.

Determination of small amounts of impurities in very pure compounds has been accomplished sometimes by careful comparisons of samples obtained from different sources. This involved a qualitative analysis made through a detailed comparison of the spectra, and a very careful quantitative comparison of extinctions of the samples at selected absorption regions. During measurement of the extinctions on a particular band, the wave length dial and the slit control knob were not moved and care was exercised to determine that the emission of the light source and the temperature of the surroundings had not changed.

Employing the foregoing technique, it was also possible to make very precise determinations of the compositions of blends of pure compounds which was done in the preparation of reference fuels.

Ignition Qualities of Hydrocarbons In the Diesel Fuel Range

A. D. PUCKETT and B. H. CAUDLE.

RAPID increase in the use of diesel engines, advent of gas-turbine and jet-type aircraft engines, and widespread use of catalytic cracking, all of which may compete for the same type and boiling range material for fuel and cracking stock, have aroused speculation as to whether ignition quality of future diesel fuels can be maintained at present levels. In the event that, through economic or other factors, the supply of high-quality diesel fuel must be supplemented by synthetic products or maintained by improving the ignition quality of material not now considered suitable, necessity for information on the cetane numbers of hydrocarbons which can be synthesized or isolated from petroleum becomes apparent. It is the purpose of this paper to present a survey of the literature, making available the extent data on ignition quality and related properties of hydrocarbons which will influence their use in fuels for high-speed diesels.

Unfortunately, the presently accepted engine test for ignition quality of diesel fuels (A.S.T.M. designation D-613) is of recent development and comparatively few data obtained by this method, or, in fact, by any engine test method, are available. A. D. Petrov and coworkers in Russia, however, using the method of Michailova and Newmann, have determined the ignition quality of a number of compounds in terms of cetene number. The procedure followed is outlined in N.A.C.A. Technical Memorandum No. 813, "The cetene scale and the induction period preceding the spontaneous ignition of diesel fuels in bombs," by M. N. Michailova and M. B. Newmann, December 1936. It consists of measuring the time lag between injection of the fuel into a heated bomb and its subsequent autoignition. This lag or induction period is converted to cetene number by use of a previous calibration. The originators of the methods present test results showing excellent correlation with those obtained from a Waukesha engine.

Cetane Numbers, Newmann Bomb

Cetene numbers by the Newmann bomb and all engine determinations of cetene and cetane numbers that could be found in the literature are presented in tables which also show other properties of the hydrocarbons pertinent to their use in diesel fuel. The tables include data on paraffins, olefins, and aromatics.

These data indicate the following general trends with respect to correlation between chemical structure and ignition quality:

1. Normal paraffins have the highest cetane numbers.
2. Aromatics have low cetane numbers.
3. In the case of brancher paraffins or alkylated aromatics, the lower the number of side chains down to a minimum of one, and the greater the length of these chains, the higher will be the cetane number.

Petrov states that his work points to monoalkylbenzenes with long but inextensively branched chains and monoalkyldacalins with short chains as being of major interest for aviation diesel fuels.

Although determination of ignition qualities of all the many possible hydrocarbons in the diesel-fuel boiling range is neither practical nor necessary, spot checks of the Russian data by the present A.S.T.M. engine to determine correlation between the engine and the bomb methods, and tests of relatively few additional compounds to fill gaps in the data appears desirable. Such a procedure would tend to strengthen the conclusions already drawn as to relation of ignition quality to structure and might permit their extension on a quantitative basis.

Catalytic Desulfurization and Reforming of Naphthas Over Bauxite

G. M. BROONER and C. J. HELMERS.

IN desulfurizing straightrun or cracked naphthas over bauxite the naphtha is vaporized and preheated to 725°-765° F. before passing through the bauxite bed wherein most of the organic sulfur compounds are decomposed with the evolution of hydrogen sulfide. Operating condi-

tions are essentially the same whether the stock to be desulfurized is a natural gasoline, straightrun naphtha, or a cracked stock.

Desulfurization of a straightrun stock removes from 75 to 95 per cent of the sulfur and normally has little effect upon the unleaded octane rating unless the sulfur content is relatively high. With stocks containing 0.15-0.2 per cent total sulfur an improvement of 4 to 7 octane numbers in the unleaded rating is not uncommon, the principal improvement, however, is noted in the leaded octane values. Depending upon the sulfur content of the naphtha and the extent of sulfur removal, desulfurization over bauxite improves the octane rating of the leaded gasoline from 2 to 10 units or more.

With continued processing carbonaceous deposits gradually accumulate and reduce the effectiveness of the bauxite catalyst. The rate of carbon deposition is primarily a function of the type and boiling range of the stock, high-end-point stocks having a higher rate of deposition than the corresponding low-end-point naphthas. The catalyst can be reactivated with the oxygen containing gas although oftentimes in desulfurizing straightrun stocks it is relatively inexpensive to discard the catalyst since naphtha throughput normally ranges from 5,000 to 15,000 bbl. per ton of bauxite before reactivation is required. At a throughput of 5,000 bbl. per ton, the catalyst cost amounts to about 1 per cent per barrel of gasoline desulfurized.

Treatment of cracked gasoline over bauxite differs from the treatment of straightrun gasoline in that sulfur removal is usually of the order of 40-60 per cent and most of the octane improvement is obtained in the unleaded rating. As a result the octane improvement is essentially the same over the entire TEL curve. Octane improvement here is a combination of the benefits of sulfur removal and some molecular rearrangement or isomerization of the olefinic constituents and ranges from 2 to 8 octane numbers, depending upon the characteristics of the cracked naphtha. Due to the olefins in cracked gasoline carbonaceous deposits collect upon the catalyst much more rapidly than in the case of a straightrun or natural gasoline, normally amounting to about 0.25 per cent by weight of the charge in a 24-hour period. Operation for periods of 24 to 48 hours between regenerations is customary.

Advantage of Straightrun Addition

Blends of straightrun and cracked naphthas may be desulfurized together. The principal advantage of adding the straightrun stock is that of diluting the olefins and decreasing the rate of carbon deposition on the catalyst, thereby prolonging the length of operating periods between regenerations.

A further application of catalytic desulfurization is that of desulfurizing high-sulfur straightrun thermal reformer stock. The improvement in lead response thereby obtained permits reforming at somewhat less severe conditions so that for the same leaded octane ratings the yield of gasoline from the desulfurized naphtha is 2 to 4 per cent higher than from the reforming of the undesulfurized naphtha.

Mild reforming of straightrun and cracked naphthas over bauxite differs from desulfurization primarily in that the temperature level is raised to the region of 950°-1,050° F., the catalyst is usually regenerated every 24 hours and, in addition to the improvement in lead response, the clear octane rating of the naphthas is increased from 5-15 octane numbers with debutanized gasoline yields of 90 per cent or more. Aside from decomposition of most of the organic sulfur compounds and some of the hydrocarbons, reactions taking place in the catalyst bed are complex. Dehydrogenation, cyclization, and isomerization are known to occur. Unlike desulfurization, reforming over bauxite produces gas other than hydrogen sulfide but due to the low operating pressure the C_3 and C_4 fractions are relatively rich in olefins and consequently can be recovered through the medium of polymerization or alkylation. Since some olefins are produced in the gasoline fraction, this mild catalytic reforming improves the research as well as the A.S.T.M. octane number and so furnishes the refiner a tool for upgrading low-octane stocks, even though the sulfur content is small.

In reforming straightrun stocks over bauxite to debutanized gasoline yields of 85-90 per cent, carbon deposition is of the order of 0.2-0.5 per cent by weight of the charge; with cracked stocks carbon deposition is about doubled due to the higher carbon-forming properties of the olefinic constituents.

A Cryoscopic Method for Determining the Purity of Dicyclopentadiene Concentrates

GARDNER C. RAY.

A METHOD has been developed for the analysis of dicyclopentadiene concentrates having purities of the order of 50-80 per cent. It is particularly suitable for the analysis of dicyclopentadiene concentrates obtained as a byproduct from certain petroleum refinery operations in which natural gas, petroleum, or its fractions are pyrolyzed. The method is based on the measurement of the depression of the freezing point of dicyclopentadiene due to the impurities present. It has the advantages of being applicable in the presence of impurities normally associated with dicyclopentadiene in mixtures produced by hydrocarbon pyrolysis and of utilizing relatively simple laboratory equipment. It may be suitably applied to the analysis of commercial dicyclopentadiene concentrates and is sufficiently rapid to permit its use in control work. Several synthetic mixtures of dicyclopentadiene with various added hydrocarbon impurities were analyzed by this method. Good agreement was found between the dicyclopentadiene content of these mixtures determined experimentally and the values computed from synthesis of the mixture.

A number of dicyclopentadiene concentrates produced from hydrocarbon cracking operations were also analyzed by this method. Relatively good agreement was found between the dicyclopentadiene contents of these products determined by the cryoscopic method and those determined by a method based on the thermal depolymerization of the dicyclopentadiene to cyclopentadiene.

Known increments of pure decyclopentadiene added to several of these samples gave normal freezing point depressions for the added dicyclopentadiene. This behavior indicated that within the limits of experimental error solid solution phenomena did not occur, or at least not to a large enough extent to interfere with the analysis.

Manufacture of Synthetic Gasoline

SCOTT W. WALKER.

THE synthesis of gasoline by cobalt catalyst was discovered in 1923 by the Germans, Fischer and Tropsch. Development work in Germany resulted in a plant capacity of 11,400 bbl. per day of low-quality gasoline by 1938. The motive in the German development was strategic rather than economic.

Improvements in the Fischer-Tropsch process and use of low-cost natural gas and oxygen have resulted in an economic process for the synthesis of gasoline and byproduct chemicals. The substitution of a fluidized iron catalyst for the German fixed cobalt catalyst has resulted in better heat control, higher-quality gasoline, fewer undesirable products, and lower investment costs. Production of the synthesis gas by partial combustion of natural gas is an innovation which depends on cheap oxygen from the modified Linde-Frankl process, and is a more efficient process than methane reforming or the steam and coke method. Two synthetic-gasoline plants are now in the design stage, and construction is to begin in the near future. It can be predicted that the utilization of this process to convert natural gas and, at some later date, coal to gasoline and chemicals will insure an adequate supply of liquid fuel in this country for many centuries to come.

Petroleum—A Basic Raw Material of the Surface Coatings Industry

ROBERT F. RUTHRUFF, The Sherwin-Williams Co., Chicago.

THE synthesis of a number of polyhydric alcohols, using gaseous hydrocarbons as raw materials, is described. The preparation of resins and of highly reactive (resin forming) unsaturated compounds from the same raw materials is mentioned. The use of liquid petroleum hydrocarbons in the synthesis of polycarboxylic acids is considered and some attention is given to the reaction of these acids with polyhydric alcohols to form alkyd resins. Some of the major difficulties involved in the synthesis of siccative oils from petroleum hydrocarbons are listed and the conclusion reached that such a synthesis is extremely difficult although not necessarily impossible. The imminent domestic production of Fischer-Tropsch liquid may well prove to be of great help in this and other syntheses.

Relation of Motor-Fuel Sensitivity And Tetraethyl Lead Susceptibility To Road Antiknock Performance

JANE F. JORDAN and T. H. RISK, Ethyl Corp., Refinery Division, Detroit.

THERE is a definite tendency in the oil industry today to stress the research ratings of gasolines. This stems from the belief that high sensitivity in motor fuels (research octane number minus motor method octane number) is an assurance of good road performance. This is true up to a certain point, but it may be very misleading to rely entirely on high research ratings. High research ratings obtained at the cost of tetraethyl lead susceptibility are indicative of a type of hydrocarbon distribution throughout the boiling range of the fuel which may result in high speed knocking. Furthermore, such fuels may have lower road appreciation (road octane number minus motor method octane number) than somewhat less sensitive motor fuels of good lead susceptibility.

Viscosity Function for Viscous Petroleum Products

THEODORE GROENING, L. C. KREHMA, and H. G. NEVITT, Socony-Vacuum Oil Co., Inc., White Eagle Division, Kansas City, Mo.

A VISCOSITY function which expresses the viscosity in terms which are additive and linear on the composition basis or with respect to other conditions or properties was examined.

This function is defined as ψ_t = log-log $(\eta + 0.6)$ where ψ_t is the viscosity function at temperature t and η is the kinematic viscosity in centistokes. The log-log function given above complies with the viscosity relationship on which the A.S.T.M. viscosity-temperature chart is based.

The ψ function is useful in evaluating the viscosity-temperature susceptibility of materials and the estimation of the viscosity of blends of viscous material from the composition and the viscosity characteristics of the base stocks. This function can also be used for relating the viscosity to other properties such as the specific gravity and is a basis for defining the viscosity characteristics when the function at one temperature and the viscosity-temperature susceptibility is known.

CORROSION In High-Pressure Gas Condensate Wells

—Gulf Coast Area

by T. S. Zajac*

PART 2

BECAUSE of the seriousness of gas-condensate well corrosion and the investments involved, most producing organizations have instigated rather extensive field corrosion-prevention programs. In general, these programs consist of the corrosion-detection and the corrosion-alleviation phases. The detection phase, consists of periodic Christmas tree inspections, tubing-caliper surveys, coupon exposures, and well effluent-water studies. The alleviation phase consists of chemical treatments and the use of corrosion-resistant materials.

To conduct a corrosion-prevention program it is necessary first to determine the place, the kind, and the amount of corrosion that occurs. This phase of the program is then followed by the corrosion-prevention or alleviation phase by which corrosion is prevented or lessened. The relative importance of these two phases of a corrosion prevention program varies during the program. In the early stages of the program, corrosion detection constitutes a large portion of the work; however, as the corrosion prevention or alleviation measures are perfected, detection becomes a minor part of the program. The following will briefly cover the various corrosion-detection and alleviation measures being employed in the field today.

Corrosion Detection

Christmas tree inspections can be accomplished quite quickly and easily, and it is not uncommon to examine a tree down to the tubing head. In the older wells, this is usually done by setting chokes or plugs in the tubing string. Where the setting of a back-pressure valve is permissible, this is another method of shutting in a well for inspection. Many times, however, the back-pressure-valve threads in a common steel hanger nipple are eaten away and the use of the first method is necessary if the tree is to be examined below the master valve. Some operators inspect only above the master valve. It is desirable, however, to inspect below the master valve especially if the tubing head is exposed to well fluid. Depending upon the severity of corrosion encountered and the condition of the tree, inspections during the early stages of a program are usually conducted every 4-6 months. Records of tree inspections are desirable and important if the progress of corrosion and corrosion prevention is to be followed.

It is not too difficult visually to inspect most of the tree fittings, the meter run, or the flow line at or adjacent to the producing well. It is, however, out of the question visually to inspect the well tubing without killing the well. This is, of course, quite costly to do and for this reason it was desirable that a less expensive means of inspecting the interior of tubing be developed.[12 13 14 15] Tubing today is inspected by the use of internal tubing calipers which can be run into the tubing on a wire line and run under well pressure. The use of tubing calipers for surveying the condition of tubing in the well is gaining in favor and is now being used by many of the operators as a part of their regular inspection program. Because of manufacturing tolerances and the irregularities produced in tubing during manufacture, it is common practice to run a datum survey and to compare subsequent surveys with it. Although tubing calipers are a great aid in determining tubing condition, they do have definite mechanical limitations. The principal limitations are: (1) Size of pits that can be detected, and (2) location where corrosion effects can be detected.

At present there is no accurate or satisfactory method of determining casing condition. The one tool today that is available[16] requires that the well be killed before a survey can be run. This tool is run in on an electrical conductor cable and has greater mechanical limitations than the foregoing described calipers. In addition since it is an electrical instrument, its results are somewhat affected by the conductance of the fluid it is run in. It, therefore, would be most desirable to have available for casing inspection, caliper tools similar to the purely mechanical ones now being used to survey tubing. One oil-field servicing organization is now working on such a tool.

The need for quick, simple, nondestructive methods of inspecting field lines continues to exist. There are available today several methods of inspecting field lines and fittings using radioactive materials.[17 18] One of these methods measures the intensity of a reflected gamma ray and the other uses a gamma ray for penetration of the test specimen and exposure of a photographic plate. Both of these methods are slow and costly, and they also possess definite limitations as to the magnitude of corrosion effects that can be detected. A supersonic-type metal-thickness gage is being marketed; however, the merits of this tool remain to be proven. Its advantages will lie in the fact that metal-thickness determinations can be made simply and quickly.

Methods of Determining Corrosion

Christmas tree inspections and tubing-caliper surveys are satisfactory methods of determining corrosion, they are of necessity, however, methods which must be applied over comparatively long time intervals. It, therefore, was desirable also to have some means of more quickly determining corrosion effects and corrosivity of a well fluid. This was particularly important if the evaluation of chemical treatments was to be accomplished quickly and easily. Much work was done by the N.G.A.A. corrosion research project committee in selecting and developing an exposure coupon which would be a satisfactory indicator of well-fluid corrosiveness. The coupons selected by the committee for checking well corrosiveness and for comparing the corrosiveness of different wells have now been standardized. These coupons are of killed mild carbon steel, 1 by 8 in. and 1 by 3 in. To date, the insertion of exposure coupons in christmas trees and/or flow lines has proven a fairly satisfactory method of following corrosion or effectiveness of chemical treatment in individual wells. The main objection to coupon testing is that the coupons show only generalized corrosion and not localized corrosion (pitting) which is also often experienced in actual service.

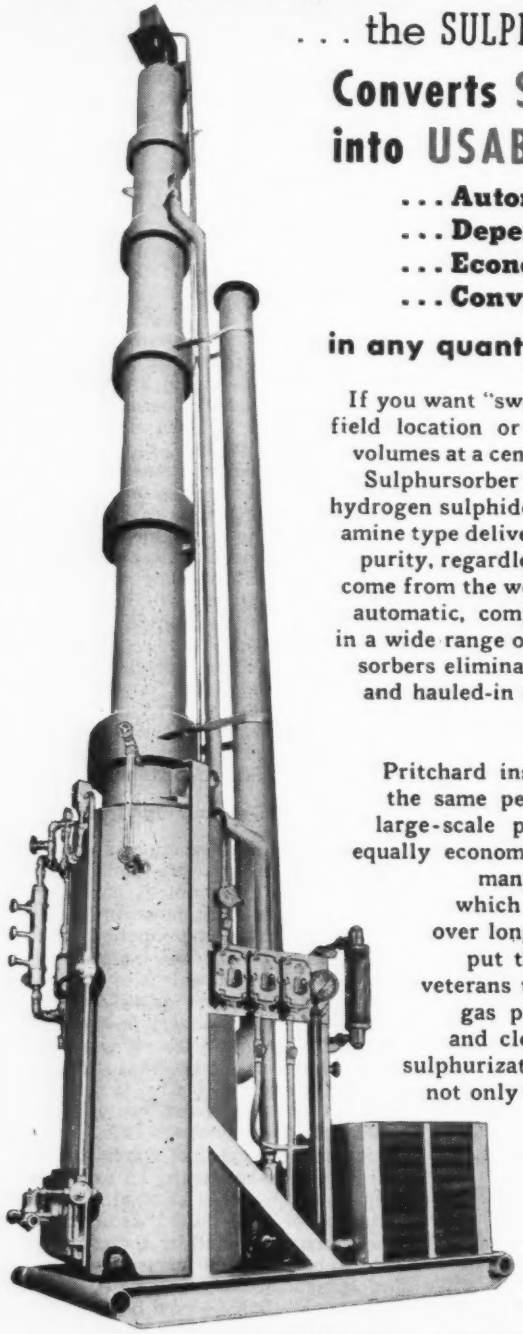
The study of well-effluent waters constitutes that portion of the corro-

*Shell Oil Co., Inc., Houston.

Pritchard's New Gas Treater
. . . the SULPHURSORBER
Converts SOUR GAS into USABLE FUEL

. . . Automatically
. . . Dependably
. . . Economically
. . . Conveniently

in any quantities, anywhere



If you want "sweet" gas at an isolated field location or want to treat large volumes at a central plant, Pritchard's Sulphursorber is the answer. These hydrogen sulphide removal units of the amine type deliver gas of any specified purity, regardless of how sour it may come from the well. Available in fully automatic, compact, *portable* design in a wide range of capacities, Sulphursorbers eliminate the daily servicing and hauled-in materials required by other gas sweetners.

Pritchard installations employing the same perfected principles in large-scale permanent plants are equally economical. Investigate the many Pritchard projects which have been operating over long periods of time and put this qualified team of veterans to work on your own gas problems, dehydration and cleaning as well as desulphurization. Pritchard offers not only the equipment developed from thorough experience but also the organization and facilities to design and construct for any requirements.

EQUIPMENT DIVISION
FIDELITY BLDG. • KANSAS CITY 6, MO.

J.F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS • MANUFACTURERS
for the CHEMICAL, PETROLEUM, GAS & POWER industries

NEW YORK CHICAGO HOUSTON ST. LOUIS TULSA PITTSBURGH LOS ANGELES
DETROIT ST. PAUL DALLAS OMAHA DENVER ATLANTA SALT LAKE CITY EL PASO

How to Speed Drill-Pipe Inspection

PREPARE tool joints for magnetic inspection with Oakite Steam - Detergent Cleaning! Delivers right to the trouble-spot a combination of controlled heat, powerful impact and vigorous Oakite detergency. Makes drill-pipe checking easier . . . faster . . . more certain. Offers a quick way to uncover hidden pipe failures and avert costly field breakdowns.

Other Money-Saving Uses!

You can employ the Oakite Steam - Detergent Cleaning technique in many other jobs where fast removal of grease, oil and sand deposits is called for. The Oakite Technical Service Representative nearby will show you where and how this money - saving, scientific method works to best advantage. Arrange TODAY for his free help.

FREE! Drop a line NOW for your free copy of the 28-page Oakite guide to improved petroleum maintenance, a manual of 88 job procedures worked out on the proved Oakite cost-saving plan.

OAKITE PRODUCTS, INC.
44C Thames Street, NEW YORK 6, N. Y.
Technical Representatives in Principal Cities of U. S. & Canada

OAKITE
REG. U.S. PAT. OFF.

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

sion prevention program concerned with following the progress of corrosion and/or inhibition. The simplest of the water studies is the iron determination, which is used as a rough index of corrosion control in any individual well, particularly in conjunction with chemical treatment. Where chemical treatment is employed, it is common practice to follow the effectiveness of the treatment by checking the amount of iron in the effluent waters. If the iron contents are appreciably lowered or completely reduced, it is assumed that corrosion has likewise been proportionately decreased. Although this means of control is not an absolute one, it is a good enough index by which trends can be followed. It is better practice, however, to follow treating trends by means of iron contents, to check relative treating efficiencies by means of coupon weight losses, and to verify the actual effectiveness of any treatment by means of periodic equipment inspections.

Water studies have been tried as a possible means of correlating the relative corrosiveness of various wells and fields. These studies consisted of determinations or iron, organic acids, chlorides, alkalinity, and total solids, and were supplemented by data on the operating conditions under which the wells were produced. To date, however, no correlation has been found between the kinds of waters produced and the corrosiveness of the wells. Water studies are also used as guides in determining the feasibility of using certain types of chemical treatments, especially of the neutralizing type where the possibility of plugging the producing string and formation exists.

2. Corrosion Alleviation

Chemical treatments. — Chemical treatments for corrosion alleviation generally fall into two groups; the neutralizing treatments employing such inorganic materials as soda ash and ammonia, and the inhibiting or protective coating treatments using materials generally of organic origin, such as Kontol 115 and naphthenic acid. The inhibiting materials usually are of the water-displacing type or plating type. To date, due to the differences in produced fluids and producing conditions, there is no one material which has found universal application as a corrosion preventive. Whereas ammonia and soda ash effectively combat corrosion in some fields, they plug the producing strings in others. This irregular behavior is also true of the organic types of chemicals in that they effecively combat corrosion in one well or field and not in another. It, therefore, is important to study the properties of the well fluid before any treatment is attempted in order to determine what type of treatment would be most applicable. Where the effluent well waters are pure, i.e. low in minerals, especially calcium and magnesium, the use of the neutralizing chemicals appears to be a practical and economical solution to the condensate corrosion problem.[11 19] The uses of sodium chromate and sodium dichromate under these conditions have been reported as successfully combating this type of corrosion,[20 21] however, again with unpredictable results. In cases where the effluent waters are highly laden with minerals, the uses of such organic materials as Kontol 115[22] and naphthenic acid[23] have been reported as holding promise for effectively combating condensate-well corrosion. In general, it appears that chemical treatment can be accomplished most economically if the smallest volume of the two produced liquids (hydrocarbon or water) is treated. In addition to the above inhibitors, appreciable work has been done on the testing of various other inhibitors, both in the laboratory and in the field. A review of this work can be found in the minutes of the N.G.A.A. corrosion research project committee for 1946.[24 25]

Although corrosion alleviation by means of chemical treatment is attaining fair success in some fields, it is not applicable at present to treating all types of wells nor is it

Want to lift a timber?
move a pump? set a pole?
or pull a stump?

THE JOB'S A CINCH with

HANDIWINCH

The most valuable, versatile "handyman" you'll ever find... an all steel winch, weight 95 lbs., easily carried, set up anywhere and operated by one man. Lifts or pulls up to 10,000 lbs. Sells for $75.00 f. o. b. your distributor.

American Hoist and DERRICK COMPANY
ST. PAUL 1, MINNESOTA

MANUFACTURERS OF HOISTS • DERRICKS • CRANES BLOCKS AND SHEAVES • GENUINE CROSBY CLIPS

Try TUNE-O-LENE
in your
TRUCKS & DIESELS
Quicker Starting • Smoother Running
REDUCES FRICTION
As Much as 50%
or Double Your Money Back

- for Crankcase
- for Upper Lube
- for Sticky Valves

5 Gal. Cans and 55 Gal. Drums for Oil Field Use

HOBB SWETNAM CO., Inc.
WICHITA FALLS, TEXAS

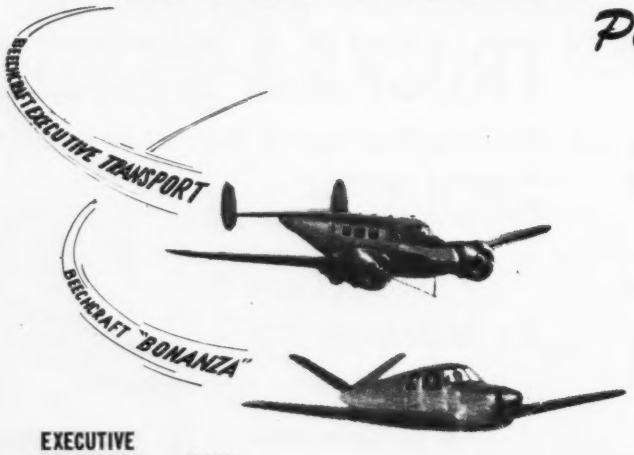
entirely trouble free. This method of corrosion prevention is now limited to wells where the injection of the chemical solution can be made into the casing annulus. This permits the chemical to gravitate down the annulus and to enter into the bottom of the producing string. A common practice in completing wells for this type of treatment is to set a packer, with a perforated nipple in the tubing string just above the packer. This allows treatment of the entire producing string, but does not allow chemical to come into contact with the formation. However, the use of open-ended string is also found, particularly in the older fields, and in conjunction with the use of the organic inhibitors. The equipment for this operation has been described in several papers.[11 19 22 25] High-pressure pumps driven either by gas expansion, or gasoline engines, or electric motors, and gravity lubricators are the usual systems employed. Allied to the chemical treatment of wells is the use of inhibitors which require relatively small quantities to effectively control corrosion, which are soluble in one of the produced phases and do not cause plugging of the producing string and which will not come out of solution or freeze in the pump or injection lines during changes of temperature. The availability of simple, trouble-free, injection pumps, with fairly wide ranges of injection capacities would also be desirable for this method of chemical treatment.

The chemical treatment of wells where injection through the annulus is not permissible, i.e. where the annulus is mudded off or where the well is dually completed for producing from two separate zones, has been reported by the Bureau of Mines[26] and the equipment described. This method employs the use of sticks of solid inhibitors which can be dropped down the tubing string against well flow. Although at present this method of chemical treatment has been tried only with sodium chromate and that with very limited success, it appears to have possibilities. It would have definite advantages from a servicing and operational standpoint, if the rate of solution of the solid inhibitor could be controlled and adequate inhibition could be attained over relatively long intervals of time with fairly small charges of chemical. The requirement that the inhibitor be a solid of fairly low solubility, limits the possible inhibitor chemicals that are available today and that could be used with this method of treatment. No method, to date, has been reported which is capable of chemically treating the annuli of dually completed wells. The use of an intermediate injection string for this purpose has obvious disadvantages, especially at this time when the absolute effectiveness of most, if not all, inhibitors is questionable.

Corrosion-resistant materials.—The availability and use of corrosion-resistant well-head equipment, along with chemical treatment of down-the-hole equipment, has done much to lessen the condensate-well operator's corrosion problem during the past year. Well-head equipment for gas-condensate service is now available in solid castings of high alloy steel or regular steel castings weld lined with corrosion-resistant materials. One oil-field-equipment manufacturer is marketing a complete christmas tree of 12 per cent chromium alloy steel. Some of this equipment has now been in service approximately 6 months, and to date no corrosion effects have been detected during periodic tree inspections. Common steel trees in this same service have lasted 8 to 12 months before replacements became necessary. Other manufacturers of oil-field equipment are marketing tree fittings weld lined with materials of the stainless and hard-facing types. This equipment also has seen appreciable service to date and likewise holds great promise for long service in gas-condensate wells. The use of baked plastic coatings, nickel coatings, and chromium coatings for tree fittings has also been reported. Although these coatings appear to be giving satisfactory service in some types of

CHARTER SERVICE ★ AIR AMBULANCE SERVICE

2 Great Planes .. Finest in the field for Personal-Business use!



Beechcraft's Executive Transport .. twin-engine, all-metal, six passenger plane .. flies 200 mph .. saves high-priced traveling time. Busy executives ride in a comfortable hurry in its luxurious, sound-proofed cabin!

The sensational Bonanza .. low-wing, all-metal, medium-priced plane .. flies 172 mph .. 750 mile range fully loaded. Highly advanced features include complete day-and-night instrumentation .. tricycle landing gear .. sound-proofed, four-place cabin!

EXECUTIVE TRANSPORT . . . $63,500. up

BONANZA . . . $7,975.

(Priced f.a.f. Wichita)

Associated with Southwest Airmotive Company

Currey Sanders Sales Rep. Shreveport

Jim Gray Sales Mgr. Dallas

Dallas Aircraft Sales, Inc.

BEECHCRAFT DISTRIBUTORS, LOVE FIELD

Phone D4-2791 Night L6-2214

FOR DEPENDABLE PUMPING . . .

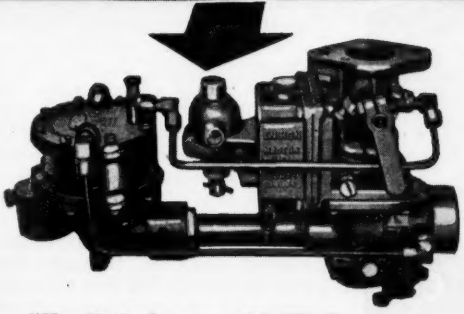
ENSIGN
CARBURETION
Leader in the Oil Industry

This gas engine, the J. I. Case model DE, is typical of thousands of ENSIGN equipped engines in service throughout the world today.

For oil well pumping service ENSIGN carburetors and fuel regulators function together as a single unit to assure long, uninterrupted engine operation. Air-fuel mixtures are accurately controlled in proper proportion for smooth, powerful and economical combustion under all engine conditions.

ENSIGN offers the finest in gas carburetion for all makes and sizes of engines used in the oil field. Let us share with you the experience we have gained in this specialized field during the past 36 years.

Carburetion equipment on the CASE gas engine at left consists of the ENSIGN model "Kgn1" updraft combination natural gas and wet fuel carburetor in conjunction with the ENSIGN model "B" Fuel Regulator.



"Kgn1" Carburetor with "B" Regulator

ENSIGN
CARBURETOR COMPANY

7010 SOUTH ALAMEDA ST., P. O. BOX 229
HUNTINGTON PARK, CALIFORNIA

Branch Factory 2330 West 58th Street, Chicago 36, Illinois

DEALERS AND DISTRIBUTORS
IN ALL PRINCIPAL OIL FIELDS

well-head equipment, their use to date has been confined mostly to test installations. It has been reported by several operators, however, that the use of plastic coatings on fittings where impingement and erosion are severe, e.g., on chokes, is not satisfactory. Since it is difficult to obtain thin homogeneous coatings of nonmetallic or metallic materials which will be absolutely free of pin holes and because it is difficult to obtain adherent coatings on sharp edges, it is felt that in the long run the use of equipment of the solid alloy type or the weld-lined type will prove more satisfactory than will the use of the thin-coated types of equipment.

One of the more serious phases of the well-head corrosion problem from the standpoint of safety is the rapid and severe corrosion of metal ring gaskets. The use of 18-8 stainless steel ring gaskets is proving satisfactory for this service and after some 9 months of service no evidence of galvanic corrosion has appeared where these alloy rings are in contact with regular steel fittings. These alloy rings although satisfactory from a corrosion resistance standpoint are expensive and, therefore, the use of other rings and means of protecting regular steel rings are being investigated. Ring gaskets of Fiberglas impregnated with plastic have been on test for approximately 4 months and evidence to date indicates that this type of ring gasket might be satisfactory for gas-condensate service, at least in the smaller sizes. The use of synthetic rubber "protector" rings to keep well fluid away from the metal rings is also being investigated. The earlier commercial rubber rings deteriorated rapidly and often were blown into the fluid stream soon after flow was commenced. Where these rings have remained in place, protection of the steel ring gasket was attained. It is felt that the idea of a protector ring is basically sound and that further development will bring forth a successful "protector" ring.

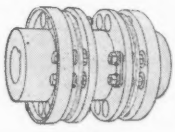
Outlook Better

Whereas the situation with respect to more resistant well-head fittings for high-pressure gas-condensate service now looks appreciably better, little has been accomplished along the same lines to brighten the picture with respect to down-the-hole tubular goods. Some baked-on plastic-coated tubing strings are now in service and again it can be said that this method of protection offers possibilities. It, however, also has certain drawbacks; namely, susceptibility of the coating to chipping, blistering, and galling, the latter especially at the threads. Where the coating remains intact, protection is complete; where it is removed, corrosion of the metal is rapid and severe because of corrosion concentration. One operator's experience with plastic-coated tubing was summarized in a recent article[11] as promising. This type of protective coating, although not foolproof, may find application in wells where chemical treatment is not possible. Its merits and economics, however, are yet to be proven. Nickel plating of the interior of tubing is also under consideration and sections of line pipe have been nickel coated and service tested in one field. From this test it appears that the use of nickel-plated coatings is feasible from the standpoint of corrosion resistance. Unfortunately, such coatings if they are to be used must present continuous surfaces to the corrosive fluid if galvanic action is to be avoided and complete protection is to be attained. To date the protection of the threaded portions of tubing joints by nickel plating or other materials has not yet been perfected.

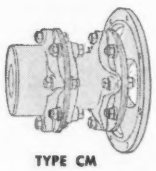
In view of the lack of some positive means of controlling corrosion in tubing strings by coatings or more resistant materials during this interim period, many operators are resorting to improving the performance of available tubing and protecting this tubing by mechanical treatments as discussed in an earlier portion of this article. One of the common operating problems encountered with tubing strings is the failure of the joint sealing surfaces through corrosion and/or erosion of the threaded surface. To avoid trouble from this source, several of the major operators are now replacing regular A.P.I.

THOMAS Flexible COUPLINGS
ALL METAL
SPECIFIED WHEREVER 100% DEPENDABILITY IS DEMANDED

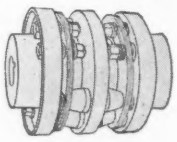
Refiners specify Thomas "Flexible" Couplings for PUMPS, COMPRESSORS, COAL PULVERIZERS, COOLING TOWERS and GENERATOR SETS.


TYPE DBZ-C

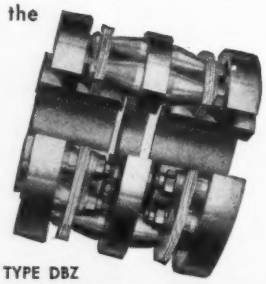
Pipe Line Men know that Thomas "Flexible" Couplings on their Low or High Speed Pumps give 100% dependable service.


TYPE CM

Drilling Engineers get the most out of their equipment with Thomas "Flexible" Couplings on Engine, Gear and Mud Pump Drives.


TYPE DBZ-B

In the Laboratory Thomas "Flexible" Dynamometer Couplings assure the greatest accuracy.


TYPE DBZ

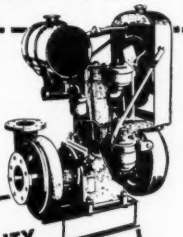
Thomas Flexible All-Metal Couplings Have No Wearing Parts. BACKLASH, FRICTION and CROSS-PULL ARE ELIMINATED.

NO LUBRICATION IS REQUIRED!

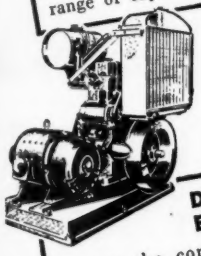
Write for the new Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

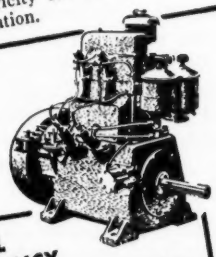
HALLETT
DIESEL ENGINES
8 and 18 h.p. for
OIL FIELD OPERATIONS



DIESEL DEPENDABILITY
makes Hallett the ideal pumping unit. Available in a wide range of capacities.



DIESEL ECONOMY
means the convenience of electricity for every oil field operation.



DIESEL EFFICIENCY
means economical and efficient stationary power. Extra large Timken bearings withstand the load from any type power takeoff.

HALLETT DIESEL ENGINES
have proved over the years to be the world's finest, dependable source of economical Diesel power.

Write Today for Illustrated Folder and Technical Data.

HALLETT
MANUFACTURING COMPANY
605J SOUTH REDONDO BOULEVARD
INGLEWOOD, CALIFORNIA
"The world's largest producer of low horsepower Diesel engines."

VALUABLE DEALER FRANCHISE OPEN
Hallett production now permits appointment of a few additional dealers. Wire or write Hallett Manufacturing Company today.

Enjoy "next door" convenience with all your suppliers

It doesn't matter where the supplies and replacement parts you need are located. They can be delivered to you in hours when you specify Air Express. Air Express gives you same-day delivery between many towns and cities. Even overnight coast-to-coast shipments are now routine.

Air Express is a better value than ever at today's low rates. Planes are bigger and faster and schedules more frequent. So, serve your customers better, and keep profits high, too! Use the speed of Air Express regularly.

Specify Air Express—it's Good Business

- Low rates include special pick-up and delivery in principal U.S. towns and cities. • Moves on all flights of all Scheduled Airlines.
- Air-rail between 22,000 off-airline offices.
- Direct air service to and from scores of foreign countries.

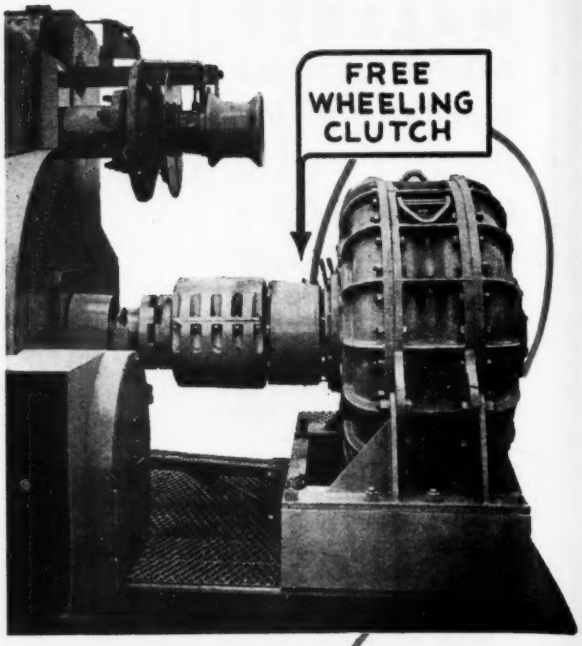
Just phone your local Air Express Division, Railway Express Agency, for fast shipping action. . . . Write today for Schedule of Domestic and International Rates. Address Air Express, 230 Park Avenue, New York 17. Or ask for it at any Airline or Railway Express Office. Air Express Division, Railway Express Agency, representing the Airlines of the United States.

AIR EXPRESS
AIR EXPRESS
GETS THERE FIRST

Rates are low

For example: to Air Express a 22-lb. shipment **1100** miles costs only **$7.43.** 10-lbs. for **$3.58.** Other weights—any distance — similarly inexpensive.

Fewer Shifts...
Faster operation..
Greater Safety



Wilson RIGS

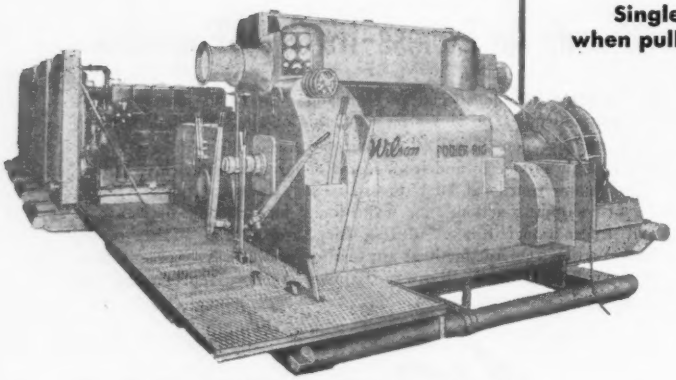
FREE WHEELING CLUTCH ON HYDROMATIC BRAKE

This sensational new Wilson feature provides greater speed and efficiency in drilling. A free wheeling clutch drives the rotor of the hydromatic brake when drum is turning to lower the pipe. When the drum turns to take up the empty block, the free wheeling clutch instantly releases and the rotor of the hydromatic brake remains motionless. Automatic operation . . . no shifting of the clutch lever.

Single step jaw clutch throws out entire drive when pulling pipe. Just engage this clutch lever one time for each trip into the hole and disengage it at the end of the trip.

This single step jaw clutch can be engaged only when drum shaft turns at very low speed . . . prevents trouble due to sudden engagement of this clutch when drum revolves at high speed and hydromatic brake is standing still. Also speeds up operation by having less levers to shift and promotes safety of operation.

The 1946 line of Wilson Rigs have many other new developments . . . investigate now!



Wilson Rigs and Winches May Be Purchased From All Recognized Supply Stores

WILSON MANUFACTURING CO., INC. ● WICHITA FALLS, TEXAS

EXPORT REPRESENTATIVE • 50 ROCKEFELLER PLAZA • NEW YORK CITY
PACIFIC COAST DISTRIBUTOR • POWER RIG & EQUIPMENT CO. • LOS ANGELES, CALIFORNIA

tubing with external upset, internal flush, Hydril tubing. It is believed that Hydril tubing will improve tubing-joint performance by decreasing turbulence around the joint and also provide a more positive seal which will not be dependent upon the sealing of the threaded surfaces. The use of upset tubing which was not fully normalized invariably resulted in so-called "ring" corrosion, probably because of differences in grain structure in the vicinity of the upset. The use of fully normalized tubing for gas-condensate service, therefore, is now standard among most operators. Further to avoid and minimize leakage at the tubing joints, with subsequent corrosion-erosion, primarily because of poor joint makeup, many operators are using power tongs as a means of obtaining uniform and consistent joint makeup.

Cost of Corrosion

The cost of high-pressure gas-condensate well corrosion to the industry has already run into the millions and probably will cost many more millions before proper relief is finally obtained. The renewal of tubing strings and well-head fittings alone has probably amounted to millions of dollars during the last year. Drilling progress necessitated by the elimination of dual completions in some fields have run into additional millions. It can be seen, therefore, that high-pressure gas-condensate well corrosion has had a very pronounced effect upon the economic production and development of gas-condensate fields.

It has been estimated by one operator[10] that known tangible corrosion costs in his field are amounting to $0.47 per M.M.c.f. gas produced. This cost is broken up into the following charges: 66.19 per cent well workovers, 8.93 per cent labor on surface equipment, 9.09 per cent surface-equipment costs, 6.76 per cent welding costs, 3.18 per cent corrosion surveys, and 5.87 per cent corrosion research. Another operator[11] estimates his annual loss due to corrosion at $200,000 per year, of which about 75 per cent goes for the periodic replacement of tubing. His estimate assumes that casing has not been damaged sufficiently to cause early casing failure. He further states that this estimated corosion loss would become secondary if one or more wells were to blow out and result in wild wells because of casing failure due to corrosion.

It should be further pointed out that the largest percentage of most gas-condensate well-corrosion costs can be attributed to tubing replacements. This, mainly because expensive well workovers are required to replace tubing strings in gas-condensate wells. Where wells are located in highly inaccessible locations or bad luck is encountered in working over the well, the cost of one well can easily run to $50,000. From this, one can see that the development of some method of protecting the well-flow strings or developing more resistant flow strings is highly desirable and necessary if corrosion costs are to be reduced appreciably.

Future Work to Be Done

Through the cooperative work of the N.G.A.A. corrosion research project committee and the effort of the individual oil companies, much has been done toward arriving at the solutions to the various phases of the high-pressure gas-condensate corrosion problem. Tools and methods for detecting corrosion have been developed and made available, corrosion-resistant christmas tree equipment has been developed and made available, and chemical methods of treating wells to decrease and control corrosion of producing equipment are presently being evolved. It, therefore, is seen that much progress has been made since the problem first became known to the industry. In many cases, because of this progress through united effort, industry is no longer troubled with the prospect of an uncontrollable and unpredictable men-

OVER MOUNTAINS
IN CONGESTED AREAS
THROUGH SWAMPS

HILL, HUBBELL
PIPE PROTECTION
FITS YOUR REQUIREMENTS

FACTORY APPLIED TO
YOUR SPECIFICATION

Your transmission and distribution lines are buried in soils of varying corrosive potentials.

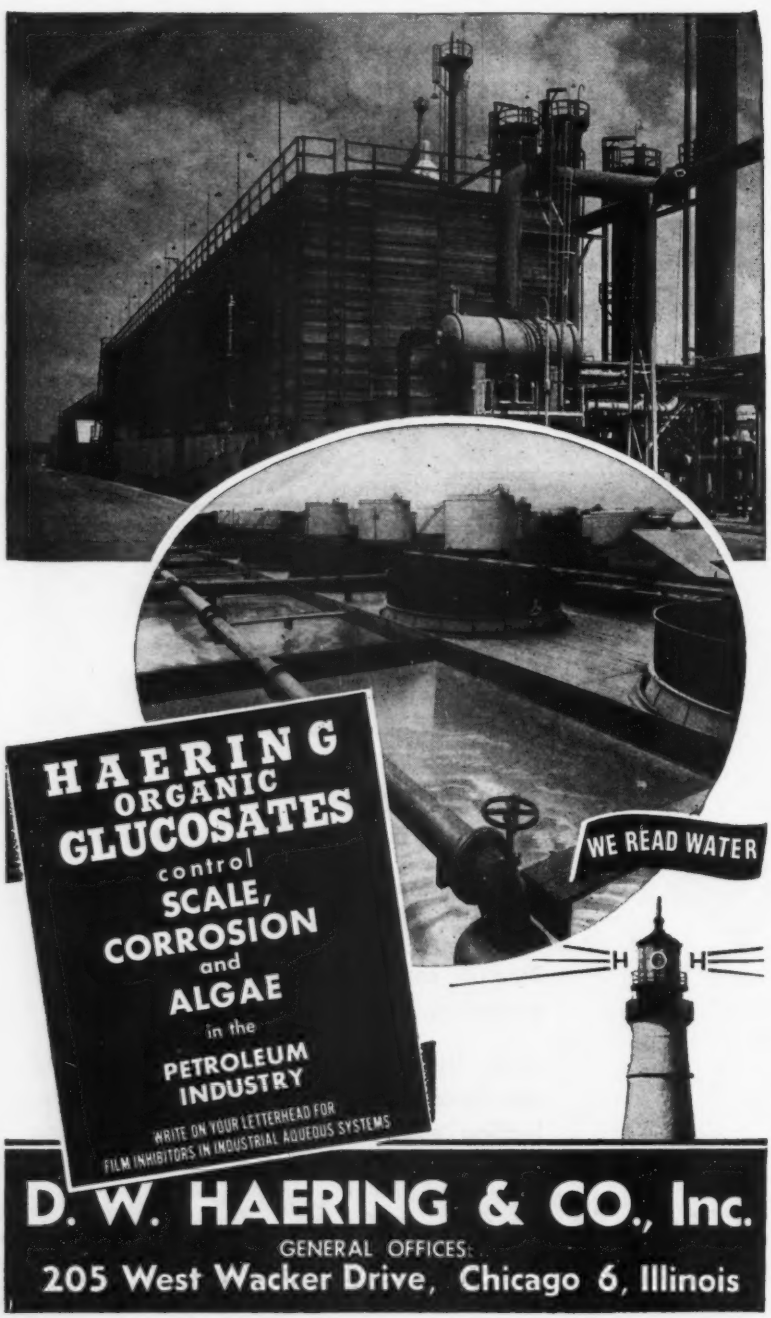
Pipe in corrosive soils require engineered protection.

HILL, HUBBELL'S modern factory applied coating-and-wrapping is widely accepted by leading engineers, because of our exacting application of all specifications.

Hill, Hubbell and Company
Division of GENERAL PAINT CORPORATION
3091 MAYFIELD RD. CLEVELAND, OHIO.

ace. On the other hand, although the problem is now under better control, it is still costing much effort and money. The future, therefore, should be devoted to the development of better and more economical equipment and protective methods, both mechanical and chemical.

It is not likely that on material or one method of corrosion control will prove to be a universal cure for all phases of the gas-condensate corrosion problem. The industry, therefore, should continue investigating all methods of corrosion control which offer practical and economical solutions. In the past, the effort was principally directed toward protecting equipment in place. Studies and developments should now be directed toward producing better and more corrosion-resistant equipment for the future. In this respect, great strides have been made in making available more resistant christmas tree equipment; however, there is still room for improvement. Practically nothing has been done on the other hand to develop better and more resistant tubular goods. It is toward this end that converted future efforts should be directed. Preliminary tests of various metals and alloys have already been conducted. Laboratory tests have indicated that steel alloys of approximately 10 per cent chrome, or high nickel content, will be required to do the job. This has now been partially verified in the field under actual service conditions and further tests are continuing. Preliminary discussions with tube manufacturers indicate that the cost of such high-alloy tubing for experimental purposes would run 10-15 times the cost of present J-55 tubing. From a long-range viewpoint, however, it is desirable to test such tubing even if costly.



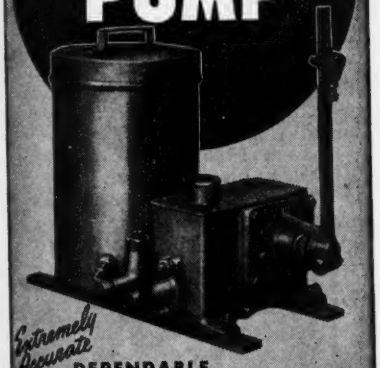
Committee Suggested

It is felt that a cooperative organization like the N.G.A.A. corrosion research project committee could do much to bring this problem before the tube manufacturers. It likewise appears that it would be desirable for the tube manufacturers to cooperate in the testing of such tubular goods since the future will probably place heavy accent on the development of more corrosion-resistant tubular goods. Much work has now been done in the field with various methods of corrosion control. The economics of alloy down-the-hole equipment, from a long-range-operations viewpoint, should now receive more attention. It is possible that fairly expensive tubular goods can now be justified on the basis of present corrosion-control costs. Some operators feel that equipment costing 2 to 3 times present tubular goods prices, can now be justified if proportionately longer life can be attained. This phase of the problem should be studied jointly by a committee of operators and tubular goods manufacturers with a view toward developing and making available more corrosion resistant tubular goods.

Although much of the preliminary work on the gas-condensate corrosion problem has now been completed, the continuation of a cooperative group like the N.G.A.A. corrosion committee is still highly desirable. Whereas the earlier work done by this committee was on short-range projects, both laboratory and field projects, it would now be desirable for the committee to set up research projects of the long-range type. A need for studies on the basic causes of corrosion and methods of corrosion prevention still exists. A continued need for disseminating and correlating the results of the various individual companies efforts will likewise exist, and it would therefore be desirable to continue to do this through a group like the N.G.A.A. committee which is thoroughly familiar with the problem. It is firmly believed that the data accumulated by this committee in the past has been of real value to everyone concerned and will continue to be so. The continued cooperation of

McCORD

TYPE "C"
CHEMICAL MEASURING
PUMP



Extremely Accurate

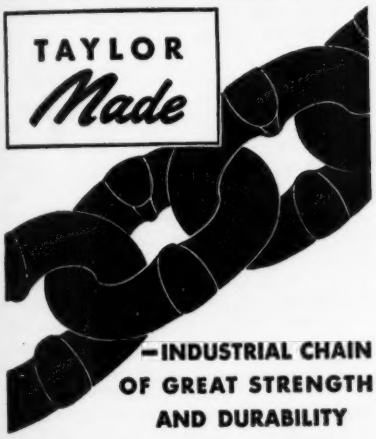
DEPENDABLE

Accuracy of delivery in McCord chemical pumps is the result of a finely engineered design with a minimum number of parts. Dependability is insured because working parts are fully enclosed, protected from dirt and the elements. Specify McCord. For sale by National Supply Co.

Standard of the Oil Fields

McCORD
CORPORATION, DETROIT 11, MICH.

TAYLOR *Made*



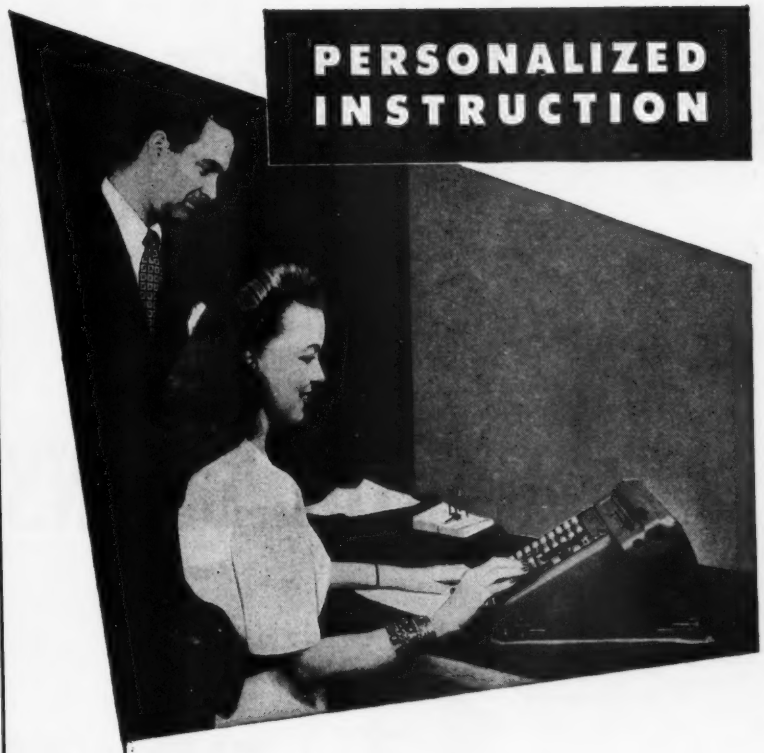
—INDUSTRIAL CHAIN OF GREAT STRENGTH AND DURABILITY

● Where the work is heavy, and the demands of service require chain that is safe and durable, there you find Taylor Made Alloy Steel Chain used extensively. For years of experience in meeting the problems of chain buyers in many fields have enabled Taylor to develop a superior chain for every industrial use. You can cut chain costs by specifying "Taylor Made". Write for prices and information.

★ ESTABLISHED 1872 S.G. TAYLOR CHAIN CO ★

Box 509, Dept. O-6, Hammond, Ind.

PERSONALIZED INSTRUCTION

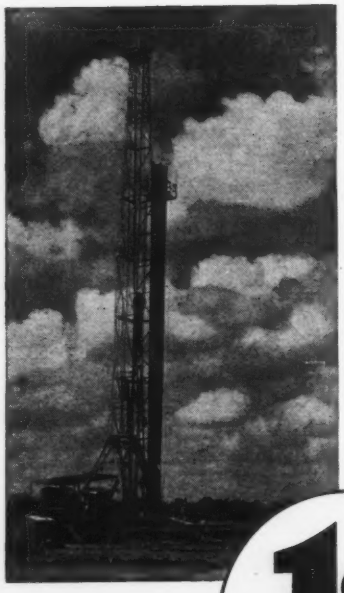


When you *buy your Friden* you get more than just a Calculator, you're taught to operate it. Yes, there is a Friden Method that fits your every figure work requirement...this Instructional Service, yours for the asking. Call your local Friden Representative today and learn how easily and efficiently you too can produce *accurate answers* to all types of accounting problems. Ask for a demonstration on a Friden model that suits your needs.

Friden Mechanical and Instructional Service is available in approximately 250 Company Controlled Sales Agencies throughout the United States and Canada.

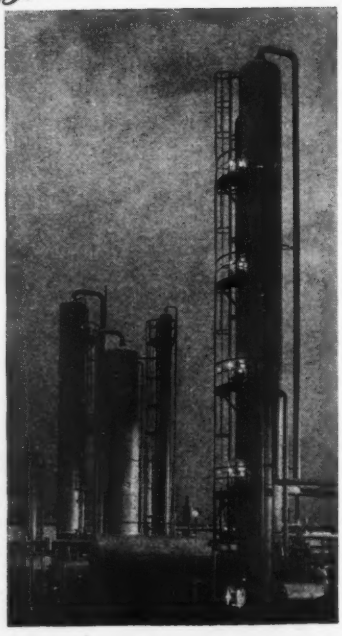
FRIDEN CALCULATING MACHINE CO., INC.
HOME OFFICE AND PLANT • SAN LEANDRO, CALIF., U. S. A. • SALES AND SERVICE THROUGHOUT THE WORLD

Look Ahead With First National



For
OIL LOANS

See— 1st of Tulsa FIRST!



A Pioneer
in Oil Financing

THE FIRST NATIONAL BANK
AND TRUST COMPANY OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

the individual oil companies as well as such groups as the A.P.I., N.A.C.E., and the Bureau of Mines is also desirable if the problem of gas-condensate well corrosion is to be solved quickly and efficiently.

Summary

1. The problem of high pressure gas-condensate corrosion is now 4 years old and although much has been done through cooperative effort toward solving this problem in the last 3 years, much still remains to be done before a complete solution is attained.

2. As markets for the lighter hydrocarbons increase and wells are produced more heavily; and, as the depth of petroleum discoveries increases and the number of gas-condensate reservoirs also increases, we can logically assume that the gas-condensate well-corrosion problem will also broaden in scope.

3. The causes of gas-condensate corrosion, on the basis of known evidence, are most likely carbonic acid or the lower fatty acids or a combination of both.

4. The N.G.A.A. corrosion research project committee has concluded the following: "Any gas-condensate well producing from a formation more than 5,000 ft. in depth, at a reservoir temperature above 160° F., and a pressure above 1,500 psi., may show attack if the gas contains carbon dioxide in excess of 0.2 per cent by volume." Although not included in the above conclusion, velocity of flow appears to have appreciable effect on the rates of corrosion encountered in producing wells. Wells, which suffer little or no corrosion at low flow rates, suffer proportionately more severe corrosion at higher flow rates.

5. In general, christmas trees and flow strings of wells producing gas-condensate fluid suffer the most severe corrosion. Flow lines also suffer from corrosion although not nearly as much as the well equipment. To date, no serious corrosion in cycling-plant equipment or injection-well equipment has been reported.

6. Because of the seriousness of gas-condensate well corrosion and the investments involved, most organizations are conducting rather extensive field corrosion-prevention programs. In general, these programs consist of the corrosion detection phases (christmas tree inspections, tubing-caliper surveys, coupon exposures, and effluent-water studies) and the corrosion-alleviation phases (chemical treatments and the use of corrosion-resistant materials).

7. Christmas tree inspections and tubing-caliper surveys are proving out as satisfactory corrosion-control indicators in well equipment. They are, however, relatively long-time-interval indicators and to permit short-time interval checks, exposure coupons and iron analyses have been de-

A TRIBUTE TO THE GREAT OIL INDUSTRY

In concluding this series of twelve editorials dedicated to the men in the industry with whom we work closely to make better rotary drilling tools, we pay tribute to all men who make up this most vigorous, most exciting and most vital industry.

There are no finer men in the world than the oil men with whom we work daily to devise, improve, and perfect tools for more efficient drilling. An oil man is an individualist, a resourceful man who can always find a better way of doing a difficult job.

We have watched many an oil man go step by step from roughnecking to the pinnacle of fame. No man more deserves the highest awards than an oil man who knows chance-taking and wearisome toil. The spirit that inspires oil men to strive and conquer has its origin in free competitive enterprise that allows individuals to advance in proportion to their worth. The almost unbelievable production capacity and the high standard of living of America is proof of that.

No. 12 of a Series

1. The Roughneck
2. The Fireman
3. The Derrickman
4. The Driller
5. The Tool Pusher
6. The Executive
7. The Drilling Contractor
8. The Engineer
9. The Geologist
10. The Drilling Superintendent
11. The Purchasing Agent
12. A Tribute to the Great Oil Industry

Reed

ROLLER BIT COMPANY

Working with the men in the field...

REED PIONEERED THE CROSS-ROLLER BIT 27 YEARS AGO

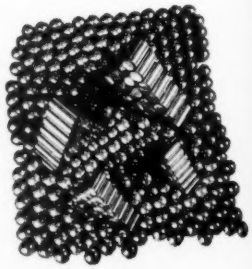
Since then constant research and improvement in design have perfected the original idea. Today the cross-roller principle in its most practical form gives Reed Rock Bits leadership in drilling efficiency.

This principle gives a strong braced support which forces the cutter teeth to take a path against their natural tendency to track. This causes the cutter teeth to ***twist*** and ***tear*** the formation as they penetrate . . . ***making for faster digging.***

REED PIONEERED SLUSH LUBRICATION FOR ROCK BITS

When rock bit engineers agreed that grease was the only way to lubricate a bit, it was Reed research and Reed experimentation which found the proper design for lubricating with slush. The Reed slush-lubricated rock bit marked another step forward in better, simpler drilling methods.

REED PIONEERED ANTI-FRICTION BEARINGS FOR ROCK BITS



Leading engineers said that roller and ball bearings would break down under the severe conditions met with in rotary drilling. But here again, Reed's persistent research solved the problem and gave the oil industry the benefits of another forward step in rock bit design.

REED PIONEERED THE INTERCHANGEABLE MUD NOZZLE FOR ROCK BITS

Realizing that each change in drilling conditions requires a variation in the jetting action of the bit for maximum efficiency, Reed engineers developed mud nozzles which can be changed at the rig, to give the driller specific jet action he wants for any drilling condition.

Reed is constantly testing, in cooperation with the men in the oil fields, nearly every conceivable cutter design under widely varied conditions. As a result of these tests, cutters are selected that give the fastest drilling and longest life in each formation.

This policy of scientific cutter selection enables Reed customers to obtain a Reed Rock Bit capable of drilling a maximum amount of straight, full gauge hole in the formation for which it is recommended.

For faster more economical hole with the right bit for each specific formation . . . specify Reed.

Only REED PIONEERING, REED RESEARCH AND REED MANUFACTURING EXPERIENCE CAN GIVE YOU REED RELIABILITY AND REED EFFICIENCY IN ROTARY DRILLING TOOLS

Reed ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK
1836 R.C.A. Building,
New York 20, N. Y., U.S.A.

ARGENTINA
Santiago Del Estero 286
Buenos Aires, Argentina

LONDON
59 Wool Exchange, Coleman St.,
London E. C. 2, England

veloped which are proving as satisfactory indicators of corrosion and inhibition progress. The need for a good casing caliper as well as a simple and rapid flow-line corrosion tester continues to exist.

8. Corrosion alleviation by chemical means now looks promising and is in some cases doing a satisfactory job; however, much remains to be done in developing more efficient and economical chemical inhibitors. Some promising inhibitors are currently on test but these will probably be specific rather than universal cures for the corrosion problem.

9. Corrosion control by chemical means has been started in wells where injection through the annulus is possible. Methods of chemically protecting wells whose annuli are mudded off also appear possible. However, no means as yet has been devised by which it is possible to protect the casing of wells producing through the annulus. For this reason most operators have now abandoned dual completions and have ceased producing wells through the annulus.

10. Tree fittings manufactured from corrosion-resistant alloys as well as regular fittings weld lined with corrosion resistant materials have done much to alleviate the operator's corrosion problem. On the other hand, little has been done in developing or making available similar corrosion-resistant equipment for down-the-hole service.

11. Through the cooperative effort of the industry, tools and methods of corrosion detection have been developed, more resistant tree equipment has been perfected, and methods of chemical corrosion control are being developed. This concerted and sustained effort, although it has not as yet provided a complete solution to the corrosion problem, has done a great deal to control what once appeared to be an unpredictable and an uncontrollable menace.

12. It is not likely that one material or one method of corrosion control will prove to be of universal application and therefore industry should continue to investigate all methods of corrosion control which offer practical and economical solutions. In the future, more stress should be laid on the development of corrosion-resistant tubular goods and on the economics of long-range corrosion control.

13. It is felt that the continuation of a cooperative group like the present N.G.A.A. corrosion committee would be most desirable and valuable. This group, however, should now concentrate on long-range studies of a more basic nature since much remains unknown about this type of corrosion as well as about the possible methods of preventing it.

Acknowledgment

The author wishes to acknowledge that a large portion of the work done in connection with the gas-condensate corrosion problem was performed by the various cooperating groups of the N.G.A.A. corrosion research project committee. The many previous papers and reports pertaining to the condensate corrosion problem have been most helpful in the preparation of this paper.

References

12. T. W. Johnson, "The Importance of Internal Corrosion of Tubing," Proc. first annual meeting, N.A.C.E., Houston, April 10-12, 1944.

13. T. W. McGuire, "The Need for a Method of Detecting Internal Tubing Corrosion," Proc. first annual meeting N.A.C.E., Houston, April 10-12, 1944.

14. R. E. Chaney, "Development and Use of the Chaney-Barnes Internal Tubing Calipers," presented N.G.A.A. corrosion research project committee, Dallas, Nov. 1945.

15. E. H. Short, "Internal Corrosion of Tubing in Gas-Condensate Wells Measured by Recording Calipers." (The Oil and Gas Journal, 43 (35) 46 (1945).

16. W. A. Sawdon, "Determining Wall Thickness of Tubing in Wells," Pet. Engr., 15 (11) 55 (1944).

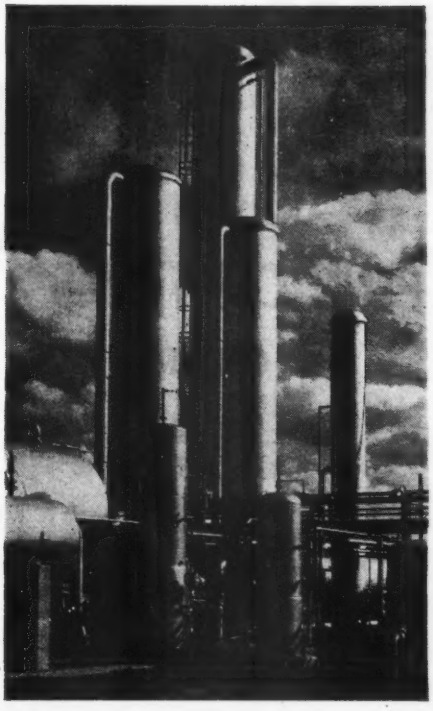
17. Penetron, "Penetron Quickly Determines Steel Thickness—also, Without Connection to Liquids, finds Levels and Densities," The Oil and Gas Journal, 44 (8) 106, 109, 110, 113, 114, 115 (1945).

18. E. H. Short, "Radiographic Inspection of Oil-Field Equipment in Place of Convenient Tool," The Oil and Gas Journal, 43 (29) 91 (1944).

19. P. L. Menaul, "Preventing Corrosion in Gas-Condensate Wells," presentation annual meeting, A.I.M.E., New York, Mar. 17-22, 1947.

20. C. K. Eilerts, H. A. Carlson, R. V. Smith, F. G. Archer, and V. L. Barr, "So-

YOU GET PROTECTION



WHEN YOU BUY

STOKES SERVICE

Covering up will not arrest corrosion. Its cause must be removed, and here's where STOKES cleaning service steps in. Then when corrosion-resistant paints of standard quality are applied you can expect longer life from refining equipment, storage tanks—all-metal construction. Play safe—PUT STOKES SERVICE on guard.

R. A. STOKES INC.

635 NIXON BLDG. CORPUS CHRISTI, TEXAS

Phones 2-2101 and 5316

dium Chromate as an Inhibitor of Corrosion in Gas-Condensate Wells," Oil Weekly, Part 1 123 (5) 17 (1946), Part 2 123 (6) 30 (1946).

21. W. D. Yale, "Prevention of Condensate-Well Corrosion by Chemical Treatment in the Erath Field," Corrosion, 2 (2) 85 (1946).

22. W. H. Justice & E. H. Jones, "Tests at Cycling Project Demonstrate Possibilities of New Corrosion Inhibitor," The Oil and Gas Journal 45 (27) 86 (1946).

23. R. L. Hock, "Corrosion Problems in High-Pressure Distillate Wells," Oil Weekly 124 (9) 33 (1947).

24. D. A. Shock, "Testing and Selection of Inhibitors for High-Pressure Condensate Wells," N.G.A.A. minutes, C.R.P.C., Vol. 3, p. 222 (1946-47).

25. D. A. Shock, "Survey of Corrosion Inhibitors for High-Pressure Condensate Wells," N.G.A.A. minutes C.R.P.C., Vol. 3, p. 199 (1946-47).

Systematic Maintenance Program

(Continued from page 92)

breakdown symbols on the job is said to have improved appreciably the accuracy of field cost reporting.

In actual performance of maintenance work the section has introduced many simple devices and methods which collectively reduce the over-all time required for the work by a substantial margin when compared with previous operations. For example, when a unit is ready for servicing a mobile tool room is positioned at some convenient location on the job site and a loudspeaker system, which serves all points on the job, is installed. The tool room is stocked with all of the usual hand tools and miscellaneous small replacement parts required normally in maintenance work. The portable tool room is equipped with telephone, electricity, and the controls and microphone for the loudspeaker system. The clerks who operate the job-site store room are provided with all of the facilities necessary for keeping accurate records on outgoing material.

Special Equipment

Sectional scaffolding is used extensively on maintenance work at this refinery as are mobile hoists of various sizes and capacities, and trucks which are equipped with winches and elevating end gates. Sectional scaffolding is used for elevations of a few feet, for workmen's convenience, up to the full height and on all four sides of a large tower. Mobile hoists are used in many lifting jobs including the removal and replacement of tube bundles and furnace tubes. The speed with which these machines operate indicates they are a large contributor to the plant's savings in time consumed in maintenance work. Elevating end gates also lend support to the speeded-up operations by providing means for placing heavy items aboard truck without the aid of hoists or similar loading devices.

In addition to improving maintenance efficiency, the section has also developed methods and procedures whereby on-the-job cleaning of equipment is accomplished in a fraction of the time required under usual methods. Tower and vessel cleaning with machinery also aids in the reduction of down time. Apparatus for this service is giving excellent results with savings in time of more than 50 per cent over the usual hand-cleaning methods. The cleaner, a self-contained unit, employs two separator chambers and a vacuum system and may be moved from job to job by truck.

From an over-all standpoint the methods developed by the maintenance section for reducing the time required in servicing and inspecting equipment show a decisive improvement over normal methods. Several new ideas now in the development stage stand to improve further the plant's general down-time average. Other ideas along the same channel are little more than in the thinking stage now, but are scheduled for development in the near future.

H. Smith Clark, formerly chief geologist for the southern division, Sinclair Prairie Oil Co., Fort Worth, has opened offices in the Sinclair Building and will do consulting work in petroleum geology and engineering.

NO DANGER TO YOUR ENGINES

...with PENN CONTROLS ON GUARD

Built in three models: oil pressure only, water temperature only, and the combination model. (Illustrated)

• Your engines are safe... when you protect them this low-cost PENN way. Major damage cannot result from any minor troubles in the cooling or lubricating systems. For the instant jacket water temperature rises too high—or oil pressure fails—PENN Safety Controls warn you by flashing a light, sounding an alarm or shutting down engine operation. Then, it is easy to find these minor troubles and correct them before they can cause major damage. Write today for full details. *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 E. 40th St., New York 16, U.S.A. In Canada: Penn Controls, Ltd., Toronto, Ont.

Typical Functions of PENN Safety Controls

DIESEL APPLICATIONS. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . closes magnetic fuel valve and opens pilot relay.

BATTERY IGNITION APPLICATIONS. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

MAGNETO IGNITION APPLICATIONS. Sounds an alarm only . . . grounds single or dual magneto . . . grounds magneto and sounds an alarm or lights a signal light.

DUAL IGNITION APPLICATIONS. Opens battery circuit and grounds magneto.

PENN AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

More Daily Flights VIA MID-CONTINENT AIRLINES between the Great Oil Centers Of Mid-America

Shortest, Most Direct
Morning, Afternoon, Evening
Schedules

TULSA

New Morning Flight
to **HOUSTON—TYLER**
Lv. Tulsa 9:55 AM
Ar. Houston 1:02 PM
11 Flights Daily
to **HOUSTON—TYLER, SHREVEPORT, KANSAS CITY**

HOUSTON

3 Thru Flights Daily
Most Direct Service to
TULSA, TYLER, KANSAS CITY

TYLER

New Thru Service
to **HOUSTON, TULSA, KANSAS CITY**
Return Same Day

SHREVEPORT

All Flights Non-Stop
to **NEW ORLEANS**
New Added Service to
TULSA, KANSAS CITY

Immediate Reservation Confirmation

For Air Reservations Everywhere Call Your Mid-Continent Agent

MID-CONTINENT AIRLINES
Serving the Heart of America

"VIC" VICTAULIC SAYS...

"NEARLY EVERY INDUSTRY USES VICTAULIC PIPING SYSTEMS!"

"You'd have a hard time today finding any industry without Victaulic Couplings and Full-Flow Fittings on the job. Oil fields, mines, ships, water works, air and chemical lines, plant fire sprinkler systems... are but a few of the many examples where Victaulic literally 'buttons up' the piping systems and helps keep the wheels of industry rolling.

"The reasons behind such industry-wide acceptance are the speedy, low-cost installations; the serviceability and salvagability permitted by the two-bolt simplicity of Victaulic COUPLINGS. They also allow *flexible* piping systems that have a union at every joint, with slip-proof, locked joints that can't pull out or blow off under pressure, vibration or sag!

"And Victaulic Full-Flow FITTINGS are so designed that their long-sweeping bends reduce friction and increase delivery... *and lower pumping costs!*

"Be sure to equip your present or proposed pipe system with Victaulic Couplings and Full-Flow Elbows, Tees and other Fittings... for the long-lasting efficiency and maintenance economy that all industry associates with the name — VICTAULIC."

Write for new Victaulic Catalog and Engineering Manual

VICTAULIC COMPANY OF AMERICA
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1
For export outside U. S. and Canada: PIPECO Couplings and Fittings: Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Have you considered Victaulic for your piping requirements?
Sizes — ¾" through 60"

SELF-ALIGNING PIPE COUPLINGS
VICTAULIC
EFFICIENT FULL-FLOW FITTINGS

Copyright 1947, by Victaulic Co. of America

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Thermal Expansion of Petroleum Liquids

We note your No. 88 sheet in The Refiner's Notebook of April 13, 1946. We observe that the expansion coefficients for the heavier oils are somewhat greater than for the corresponding paraffinic compounds and we wonder if these are average values for oils in those gravity ranges? Can you refer us to data which would give the maximum and minimum limits of temperature expansion?—L. S. K.

The basic data underlying the specific gravities shown in Notebook No. 88 as a function of temperature was correlated by the author in The Oil and Gas Journal of January 27, 1938, page 184, "Determining Densities of Oils at High Temperatures."

No entirely satisfactory, or at least simple, method of showing the effect of temperature or density is possible because of the numerous types of hydrocarbons that are encountered and because temperature cannot be entirely divorced from pressure in considering densities, particularly at high temperatures. Firstly, decomposition tends to take place at temperatures past about 700° F. with most hydrocarbons. Hence, data that extend past this temperature are obtained only with great difficulty, are simply extrapolated data, or must be based on these low-boiling hydrocarbons which have critical temperatures below 700° F. Secondly, the density of liquids is affected by pressure, greatly so at temperatures near the critical temperature, and in order to maintain a liquid phase at any temperature higher than the regular boiling point, pressure must be applied. Thus, as the oil is heated it is necessary to apply higher and higher pressures until finally at the critical temperature it is necessary to apply the critical pressure.

To present lines of gravity versus temperature as in Notebook No. 88 and at the same time to take into account the effect of temperature and pressure would become so complicated that it would destroy the usefulness of the chart. In fact, each line on the chart would have to be expanded into a series of lines for materials of different hydrocarbon composition, and in turn each of the lines of this series would have to be expanded into a new series of lines for different pressures.

To bring these several factors together it is necessary to resort to complicated factors such as characterization factor, reduced temperature, reduced pressure, etc. Hougan & Watson in their Fig. 109 (Thermal Expansion and Compression of Liquids) in "Chemical Process Principles" (John Wiley & Sons, New York) present such a correlation.

Fig. 1 on this page indicates the complicated relationship of density to temperature and pressure. It is for normal hexane and was computed by the Hougan & Watson method. The solid lines are for constant pressures but the dotted line is for hexane at its vapor pressure for each of the temperatures. The dotted line is probably nearest to the situation covered by lines that appear in the literature such as The Refiner's Notebook No. 88.

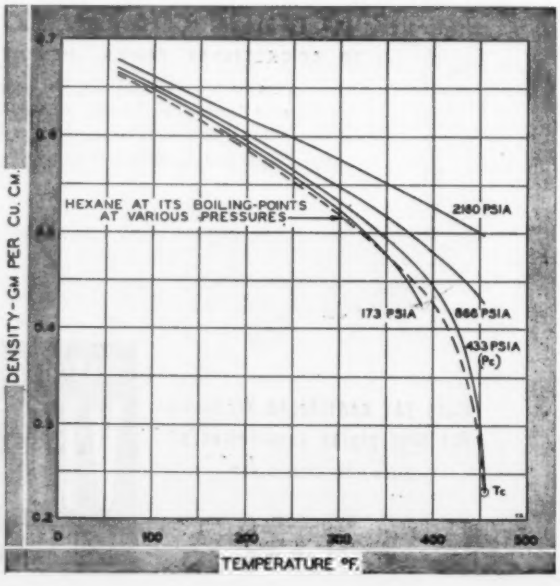


Fig. 1 — Approximate densities or specific gravities of hexane at different temperatures and pressures

Coal and Oil Costs—AGAIN

Comment.—This third comment on our item of April 5, 1947, page 76, entitled "Cost of Coal and Oil," indicates a live interest. G.F.C. comments that our comparison is unfair to oil, that there are many advantages which he lists and challenges anyone to show an equal number of advantages for the firing of coal. His list of advantages of oil over coal for firing boiler plants is:

1. No deterioration of oil in storage.
2. Storage may be distant from boiler.
3. Freedom from spontaneous combustion.
4. Weight 30 per cent less and space occupied about 50 per cent less than coal of an equivalent total heat content.
5. High combustion rates per cubic foot of furnace cavity.
6. High efficiency and practically no smoke.
7. Absence of wear on machinery because of no dust or ash.
8. Great flexibility in adjusting boiler to load requirements.
9. Labor not required to remove ash or cleaning fires.
10. Low labor cost to clean boiler tubes and no labor to move fuel to the furnace.
11. Low pressure drop through boiler.
12. Excess air required is lower.
13. Fuel is immediately available and it may be stored or withdrawn with a minimum of labor.

How to Determine Vapor Pressure of Hexane-Plus Fraction

In your answer of May 10, 1947, entitled "Relation of Reid to True Vapor Pressure," you used a vapor pressure of 1.63 psia. which was not based on much of anything. Isn't specific gravity a better basis for estimating vapor pressure than molecular weight?—D. D. E.

Specific gravity is more closely related to vapor pressure than molecular weight. If vapor pressure must be estimated, the best properties to start from, and in the order of accuracy, are probably:

1. Average boiling point.
2. Specific gravity.
3. Molecular weight.

Boiling point is best because vapor-pressure lines versus temperature are nearly the same for all hydrocarbons particularly through short ranges of temperature. Specific gravity is also reasonably good because it is moderately affected by chemical structure whereas materials of the same molecular weight but different structures have widely differing boiling points.

DOWELL

SUBSIDIARY OF THE DOW CHEMICAL COMPANY

How much POWER

—can Dowell chemical cleaning restore for you?

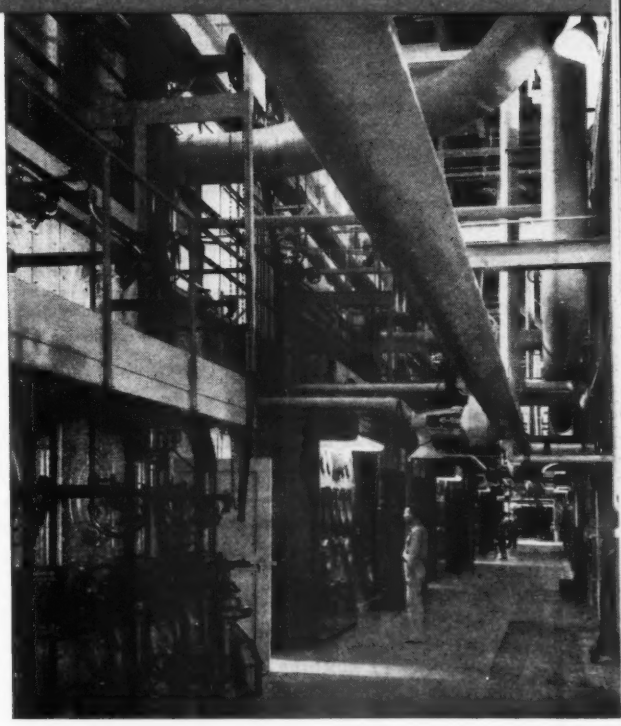


Figure it in dollars and cents: How much power are you losing due to accumulations of scale and sludge in boilers, condensers and other heat-exchange equipment? How much is it costing you for the extra fuel required to overcome the reduced efficiency imposed on your plant by *insulating deposits?*

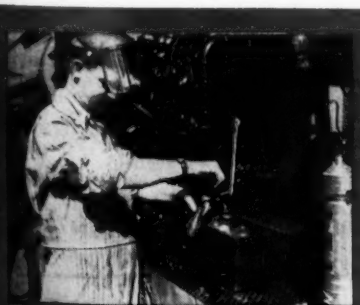
Take a good look at your designed operating efficiency—and compare it with the *actual output* you are securing. Then call the nearest Dowell office for the facts and figures on *chemical* scale removal service.

Leading plants everywhere rely upon Dowell service—including some of the largest boiler installations in the nation. They tried Dowell service and found it rapid, safe and economical. They've seen Dowell engineers fill plant equipment with liquid solvents designed to dissolve and disintegrate scale and sludge—and they've seen the *results*. You'll make no mistake to follow their example—get the facts.

DOWELL INCORPORATED • TULSA 3, OKLAHOMA

New York, Boston, Philadelphia, Wilmington, Baltimore, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, Kansas City, Wichita, Oklahoma City, Houston, Fort Worth, Shreveport, Mt. Pleasant, Michigan; Salem, Ill.; Borger, Texas; Wichita Falls, Texas; Midland, Texas; Lafayette, La.

Long Beach, Casper: Dowell Associate—International Cementers, Inc.



Dowell service is supervised by trained engineers using carefully selected liquid solvents and special mobile equipment.

DOWELL

FOR INDUSTRIAL CHEMICAL SERVICE

TWO CAR LOADS of BRONZE and GALVANIZED FLEXIBLE STEAM HOSE

SIZE	DESCRIPTION	PRICE FOB CHICAGO HOSE	COUPLINGS
½"	TYPE S-1-C: BRONZE FLEXIBLE STEAM HOSE Mfr. American Metal Hose Co. 1" IPT Male & Female Removable cplgs attd	60c ft	3.00 set
¾"	TYPE RT-15: BRONZE FLEXIBLE STEAM HOSE Mfr. Chicago Metal Hose Co. 1" IPT Male & Female Removable cplgs attd	40c ft	3.00 set
1"	TYPE BD-15: BRONZE FLEXIBLE STEAM HOSE Mfr. American Metal Hose Co. 1" IPT Male & Female Removable cplgs attd	58c ft	3.00 set
1¼"	TYPE BD-15: BRONZE FLEXIBLE STEAM HOSE Mfr. American Metal Hose Co. 1¼" IPT Male & Female Removable cplgs attd	79c ft	4.00 set
2"	TYPE BD-15: BRONZE FLEXIBLE STEAM HOSE Mfr. American Metal Hose Co. 2" IPT Male & Female Removable cplgs attd	1.30 ft	6.50 set
2½"	TYPE BD-15: BRONZE FLEXIBLE STEAM HOSE Mfr. American Metal Hose Co. 2½" National Standard Thread Male & Female removable cplgs attd	1.40 ft	9.00 set
1"	TYPE RT-15: GALVANIZED STEEL FUEL OIL HOSE Mfr. Chicago Metal Hose Co. 1" IPT Male & Female couplings attd	25c ft	3.00 set
4"	TYPE RT-15: GALVANIZED STEEL FUEL OIL HOSE 4" National Standard Thread Male & Female cplgs attd	1.00 ft	15.00 set

All of the above hose is made from heavy strip, steel or bronze-interlocking design, with inner packing of hi-grade asbestos. Widely used for handling steam at low and moderate pressures. Unloading and loading tankers and barges, steaming out tank cars, bituminous distributors and other "hot" process jobs. Handles greases, oils, fats, hot tar and asphalt, etc.

The entire quantity is in our CHICAGO WAREHOUSE. Orders will be filled promptly for all or any part of this material.

CALL . . . . WRITE . . . . WIRE

AMAZON HOSE & RUBBER CO.

130 N. JEFFERSON ST., CHICAGO 6, ILL.

PHONE FRANKLIN 4073

HOSE AND TUBING SPECIALISTS FOR OVER 25 YEARS

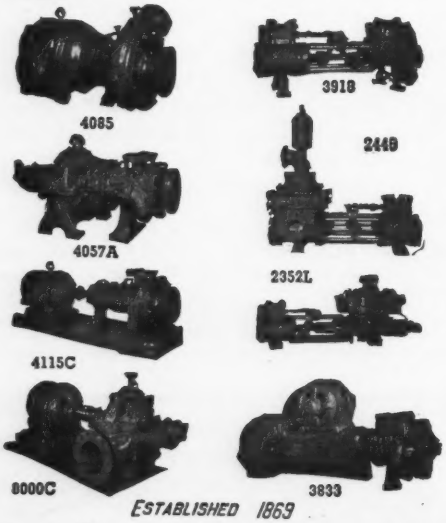
PUMPS

CENTRIFUGAL

RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS

Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W TENTH ST.

Just Published

VOL. III of "Petroleum Production" — to be published in 5 volumes

PETROLEUM PRODUCTION

By PARK J. JONES, Consulting Engineer, Houston, Texas

Volume III: Oil Production by Water

The third in a series of five volumes which will comprise the most thoroughgoing treatment of the engineering aspects of petroleum production ever presented. Contents include: Part I: FOUNDATIONS: Oil Ahead of Water; Oil Production by Expansion; Well Producing Capacity; Injection of Water; The Optima for Reservoirs; Migration of Oil; Part II: APPLICATIONS: Radial Reservoirs; Two Pay Intervals; Impermeable Wedges; Saturated Oil; Linear Reservoirs; Elongated Reservoirs; Bottom Water.

282 Pages Illustrated $5.00

Volume I: Mechanics of Production: Oil, Condensate and Natural Gas

Contents include: Elements of Production Mechanics; Characteristics of Pay and Nonpay; Permeability of Linear and Radial Systems; Interstitial and Free Water; Application of Electric Logs; Composition of Hydrocarbons; Properties of Reservoir Gases and Liquids; Separator Samples and Equilibrium Constants; Displacement of Oil and Water by Gravity; Invasion Factors and Patterns; Displacement of Condensate by Cycling; Volumetric Balances.

231 Pages Illustrated $4.50

Volume II: Optimum Rate of Production

Contents include: The Maximum Efficient Rate of Production; Oil, Condensate and Natural Gas Reserves; Well Producing Capacity for Reservoirs; Interest Factors; The Period of Development; Uniform Rates of Production; Uniform Rates of Depletion; Economic Limits for Wells and Reservoirs; Increasing Rates of Depletion; Decreasing Rates of Depletion; The Optima for Uniform Rates of Depletion; The Optima for Variable Rates of Depletion; Exponential Functions; Natural Logarithms.

295 Pages $4.50

Volumes in Preparation:

IV: Condensate and Natural Gas Production

V: Primary and Secondary Production Methods

Send for complete list of 13 titles of books dealing with the subject of Petroleum.

REINHOLD PUBLISHING CORPORATION

330 West 42nd Street New York 18, N. Y.

MODERN Rotary DRILLING

Proper Control of Rate of Feedoff of Drilling Line

PROPER control of the rate of feed off of the drilling line from the draw-works drum is of fundamental importance since it determines the uniformity of the weight placed on the bit. In turn, maintenance of the proper and uniform weight on the bit is one of the most important factors controlling the efficiency of drilling operations, since it determines, to a large extent, the rate of penetration and the useful life of bits.

Despite the importance of this problem, the manner in which the feed-off control is accomplished in the past was rather crude. Designed to handle the heavy loads of lowering drill pipe and casing, the mechanical friction brakes sometimes were not sensitive enough to permit the relatively delicate adjustments needed to maintain uniformity of the bit weight. The line was fed off irregularly at intervals. This can induce vertical vibrations in the elastic drill-stem string, and tend to change the actual weight on the bit. Also, the practice of placing on the bit weight larger than needed, and drilling it off to a lighter weight, affects unfavorably the life of the bit.

Manual Control

These problems become more severe as the depth of wells increases. Therefore, now, much more than in the past, any practical device which makes possible uniform rate of feedoff, contributes toward increase of efficiency of drilling operations. First step in this direction is provision for manual feedoff control by means other than the friction brake. Second step, and ultimate goal, is automatic feedoff control.

Two of the methods of manual control may be considered here as representative. They both have the aspects of semiautomatic operation, since the rate of feedoff may be set at any desired figure. However, they are not fully automatic, since the control, once set for a given rate, does not respond to changes in drilling conditions encountered by the bit.

Hydraulic control.—This control, which has been in use for a number of years, utilizes regulation of the discharge of a power pump driven from the draw works, to control rate of feedoff. To provide safe pump pressures a speedup gear is interposed between the draw works and the pump, the ratio of the unit now commercially available being 250 to 1. Thus the high line tension and slow drum speed are changed to low torque and high speed at the pump. Even at extremely low rates of drilling the speed of the pump is sufficiently high to give the needed fluid discharge.

The pump circulates fluid from a tank, mounted on the pump skids, through the discharge control, located at the driller's position, back to the tank. The discharge control consists of a series of orifice valves of different sizes, which offer wide selection of discharge flow adjustments. Feedoff of the line is smooth and uniform and may be regulated down to very low rates. By closing all the valves of the discharge control and stalling the pump the pipe may be held off bottom without developing excessive pump pressure. For instance, for 32 in. drum and eight lines, a load of 200,000 lb. may be held off bottom with stalled pump pressure of 175 psi.

For operations other than drilling, the control is declutched from the draw works. The whole unit weighs around 5,000 lb. and is 11 ft. long and 2 ft. wide. It may be used for emergency hoisting if provided with a small independent prime mover.

"Walking brake" control.—This control of feedoff is incorporated into recently developed pneumatic draw-works brake system. (Installment 15). It is based on the so-called walking-brake principle. In drilling, only one of the two brake bands is engaged at a time, the rate of the feed off being regulated by a hydraulic cylinder controlling the movement of the engaged brake band. As the hydraulic cylinder reaches the end of its stroke, the second band engages, taking over the control through its own hydraulic cylinder, while the first band disengages. Arrangement is made for smooth transfer of load from one brake band to another. The rate of feedoff is regulated in the hydraulic feed-control manifold. Smooth and uniform feedoff of the line is provided up to the rate of 65 ft. per hour, with 10 lines strung. Conventional friction braking action is available for emergencies, while the hydraulic control is in operation.

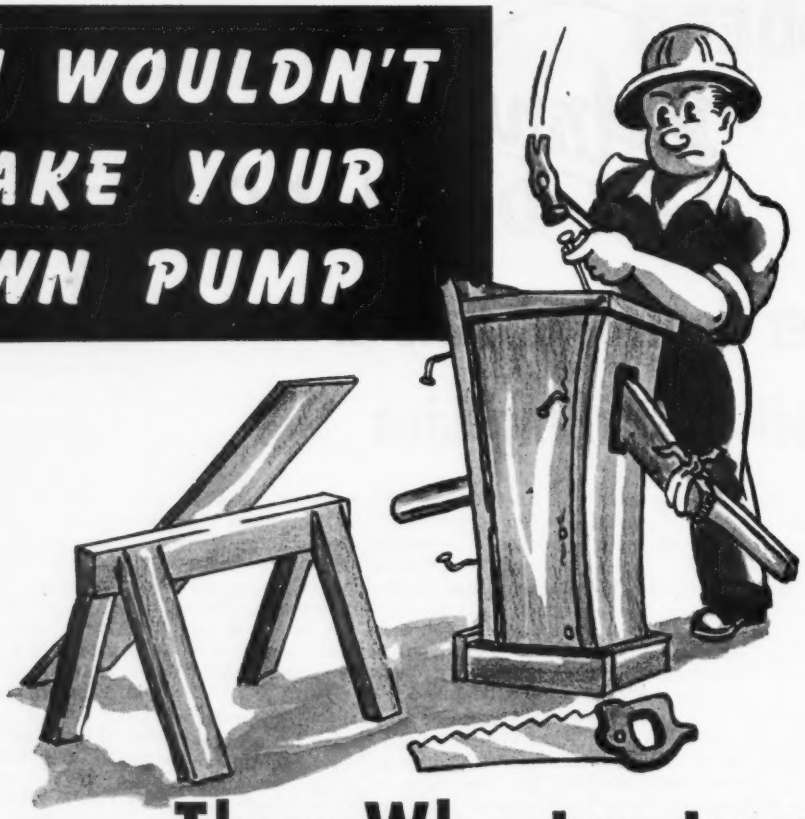
Automatic Control

Developed by one of the major operators, a feedoff control which automatically maintains constant weight on a bit has been used successfully in deep drilling. The control mechanism is responsive to bit-weight fluctuations as registered by the weight indicator. Any bit weight for which the control is set is maintained with reasonable tolerance. Data on wells drilled with this control under conditions which permit comparisons with other wells drilled without the controls, indicate clearly the value of automatic regulation of the feedoff rate. This value lies primarily in the increased useful life of the bits, with the resulting decrease in the number of the bits used and in the number of the round trips needed.

Two different systems of automatic feed control are now in the process of development. The two methods go considerably beyond what is now considered automatic feed control. If successfully developed and found practical these methods would represent an important step toward making drilling operations much more automatic.

No. 26 in a series by Joseph Zaba, petroleum engineer, Houston

YOU WOULDN'T MAKE YOUR OWN PUMP



Then Why try to make your own Power

To find how you can benefit with this better power, call the Power Engineer of your local Utility Electric Power Company . . . he's ready to assist you with any of your power problems.

Use Low-Cost *Utility Electric Power!*

Dependability . . . a prerequisite of a good mud pump . . . is what a drilling contractor demands. So he buys one from a reliable concern that specializes in the manufacture of heavy oil field equipment.

If you want dependability in power . . . look to your local Utility Electric Power Company. Power is their only business. They have the technically trained personnel . . . the service facilities . . . the "know-how" . . . to give you not only the best in power . . . but the most economical power.

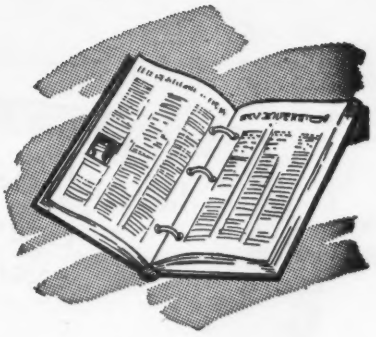
Use Utility Electric Power!

PETROLEUM ELECTRIC POWER ASSOCIATION

Box 1498, Oklahoma City, Oklahoma

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Impeller Size and Pump Speed

THE characteristic curves of a centrifugal pump (The Refiner's Notebook No. 149, June 21, 1947) are altered by changes in the speed or changes in impeller size according to the so-called affinity laws:

$$\frac{\text{New speed}}{\text{Old speed}} = \frac{\text{New capacity}}{\text{Old capacity}} = \left(\frac{\text{New head}}{\text{Old head}}\right)^{1/2} = \left(\frac{\text{New BHP}}{\text{Old BHP}}\right)^{1/3}$$

$$\frac{\text{New dia.}}{\text{Old dia.}} = \frac{\text{New capacity}}{\text{Old capacity}} = \left(\frac{\text{New head}}{\text{Old head}}\right)^{1/2} = \left(\frac{\text{New BHP}}{\text{Old BHP}}\right)^{1/3}$$

Example.—A centrifugal pump has an impeller diameter of 18 in. and when operating at 1,750 r.p.m. exhibits characteristic curves as shown in solid lines in chart on this page. A capacity of 1,000 g.p.m. at an 800-ft. head is desired and can be obtained by increasing the speed or the impeller diameter.

To use the graphical method suggested here the curves should be plotted in log-log paper. The lines A and B indicate graphically the square root and cube root relationships of the affinity laws and their position and slope are the same for any pump.

Locate the (circle) point which represents the new conditions (1,000 g.p.m. and 800 ft.) and draw a line by means of triangles) from the circle point to the old head curve of the same slope as line A. The length of the line (rule or dividers) when marked off along line A using 1.0 as the base point, indicates that the ratio of speed or impeller size is 1.55. Thus, the new speed or size is:

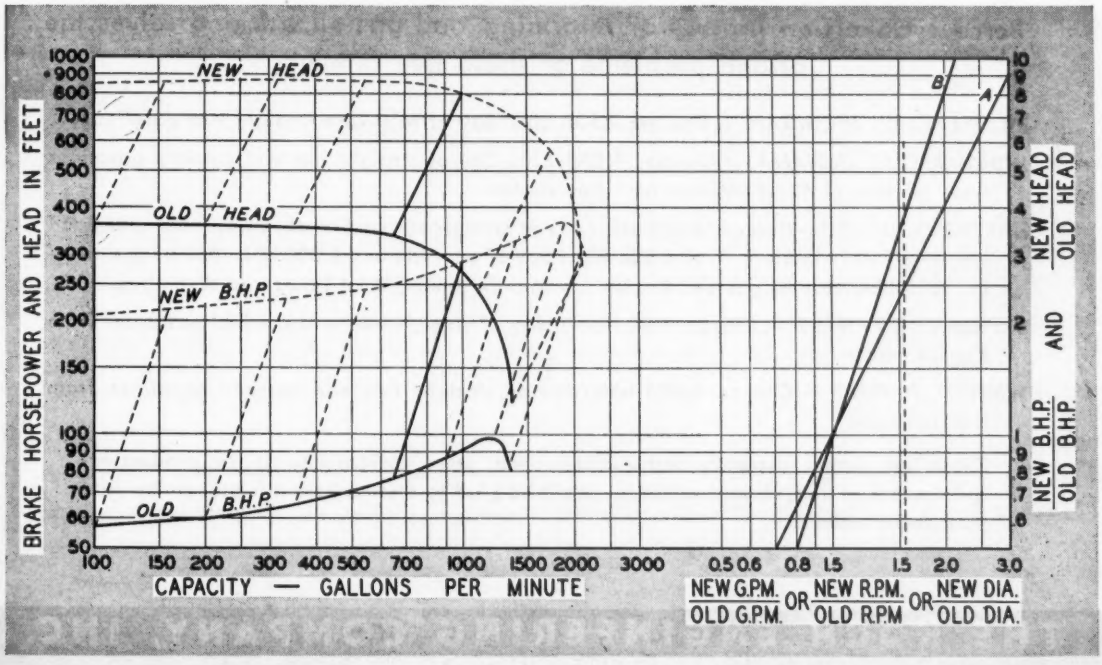
Speed = 1.55 × 1,750 = 2,720 or dia. = 1.55 × 12 = 18.6 in.

The entire new head curve (dotted) can be constructed by employing a series of lines that are parallel and of the same length as the one constructed above.

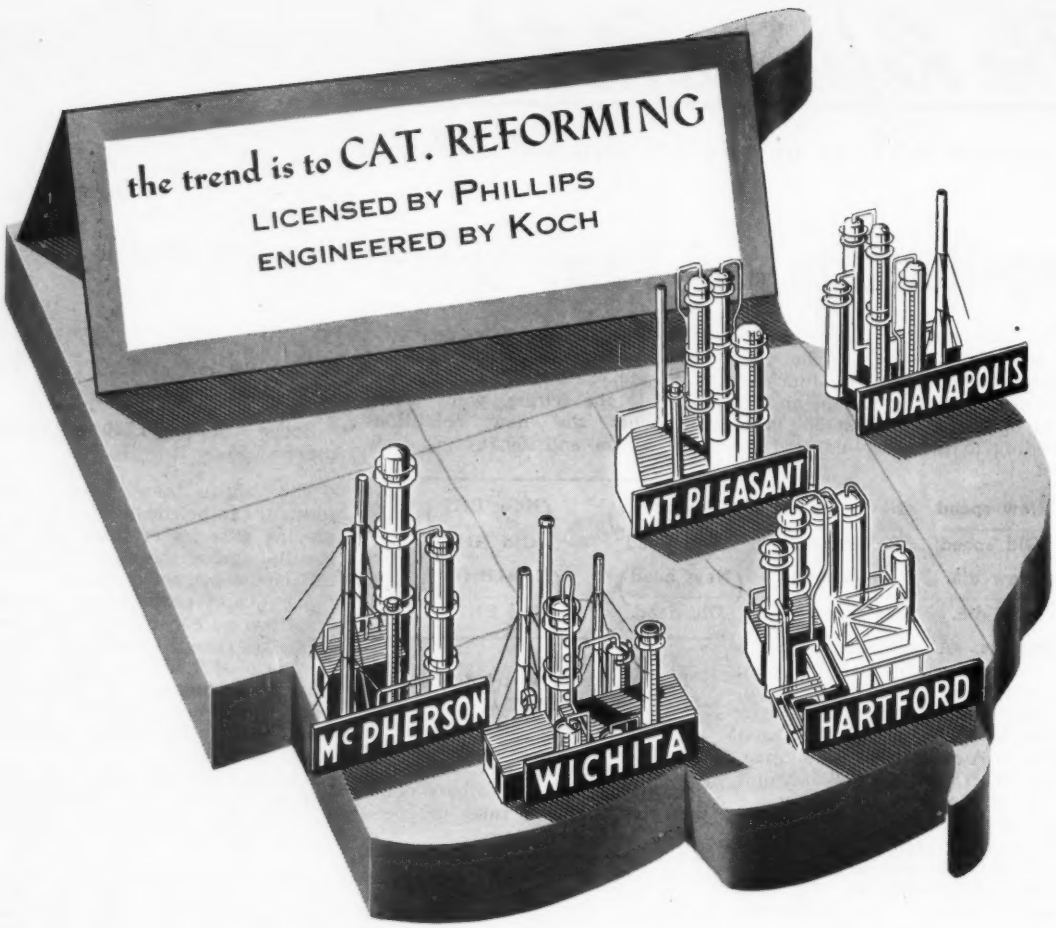
A new horsepower curve (dotted) may also be constructed by measuring the length along line B to the ratio of 1.55 and transferring this "measuring line" to the horsepower curve as shown in the figure. The new horsepower is found to be 285.

The new phelipheral speed must not be too large and hence check the new speed and diameter against this tabulation:

	Maximum speed, r.p.m.								
Dia.	2″	6″	10″	14″	16″	18″	20″	22″	24″
Cast iron	28,800	9,600	5,760	4,120	3,600	3,200	2,880	2,620	2,400
Bronze	43,200	14,400	8,600	6,180	5,400	4,800	4,320	3,940	3,600


NEW HEAD
OLD HEAD
NEW B.H.P.
OLD B.H.P.
BRAKE HORSEPOWER AND HEAD IN FEET
CAPACITY — GALLONS PER MINUTE
NEW HEAD / OLD HEAD AND NEW B.H.P. / OLD B.H.P.
NEW G.P.M. / OLD G.P.M. OR NEW R.P.M. / OLD R.P.M. OR NEW DIA. / OLD DIA.
A
B

No. 150 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



Perco cycloversion process of reforming and gas oil cracking solves the octane problems of these five refiners:

MT. PLEASANT, MICHIGAN — **Charge: 2,500 bbls/day of Michigan straight run gasoline.**

INDIANAPOLIS, INDIANA — **Charge: 4,000 bbls/day of straight run and cracked gasolines from mixture of Mid-Continent pipe line crudes.**

HARTFORD, ILLINOIS—**Charge: 8,000 bbls/day of straight run and cracked gasolines processed separately or in mixture — or 6,000 bbls/day of gasoline and 2,000 bbls/day of gas oil — or 5,000 bbls/day of gas oil. Crudes are Mid-Continent, West Texas and Wyoming.**

McPHERSON, KANSAS — **Charge: 5,000 bbls/day of straight run and cracked gasolines from Kansas crude.**

WICHITA, KANSAS — **Charge: 4,000 bbls/day of straight run and cracked gasolines from Kansas crude.**

These five plants, currently under construction, were designed to fit the product requirements of the various refiners. We'll be glad to discuss how this process fits into your requirements.

THE KOCH ENGINEERING COMPANY, INC.

CONSULTING AND CONTRACTING ENGINEERS

335 West Lewis Street, Wichita, Kansas

British Associates: Messrs. A. F. Craig & Company, Ltd., Paisley, Scotland

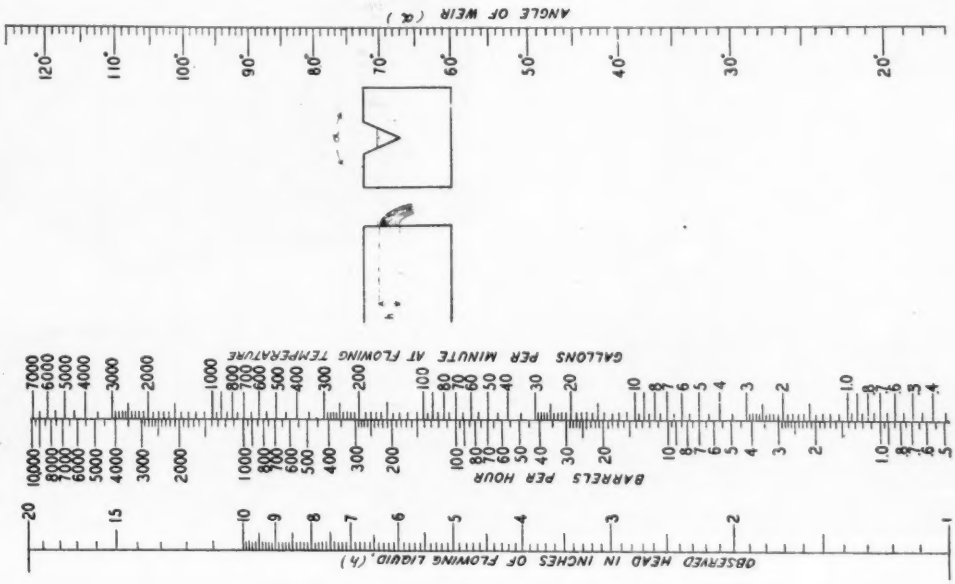
ENGINEERING *fundamentals*

This is the sixth of a series of useful graphs, alignment charts, and fluid-flow curves presented through the courtesy of the Southern California Meter Association.

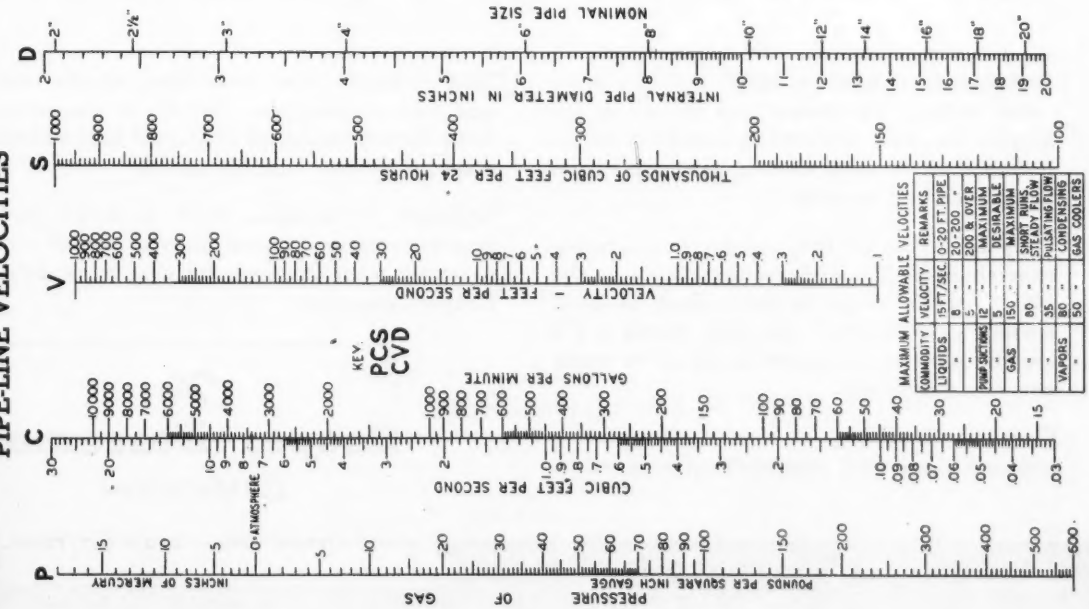
Measurement of Nonviscous Liquids by

SHARP-EDGED V-NOTCHED WEIRS

(With complete end contractions)

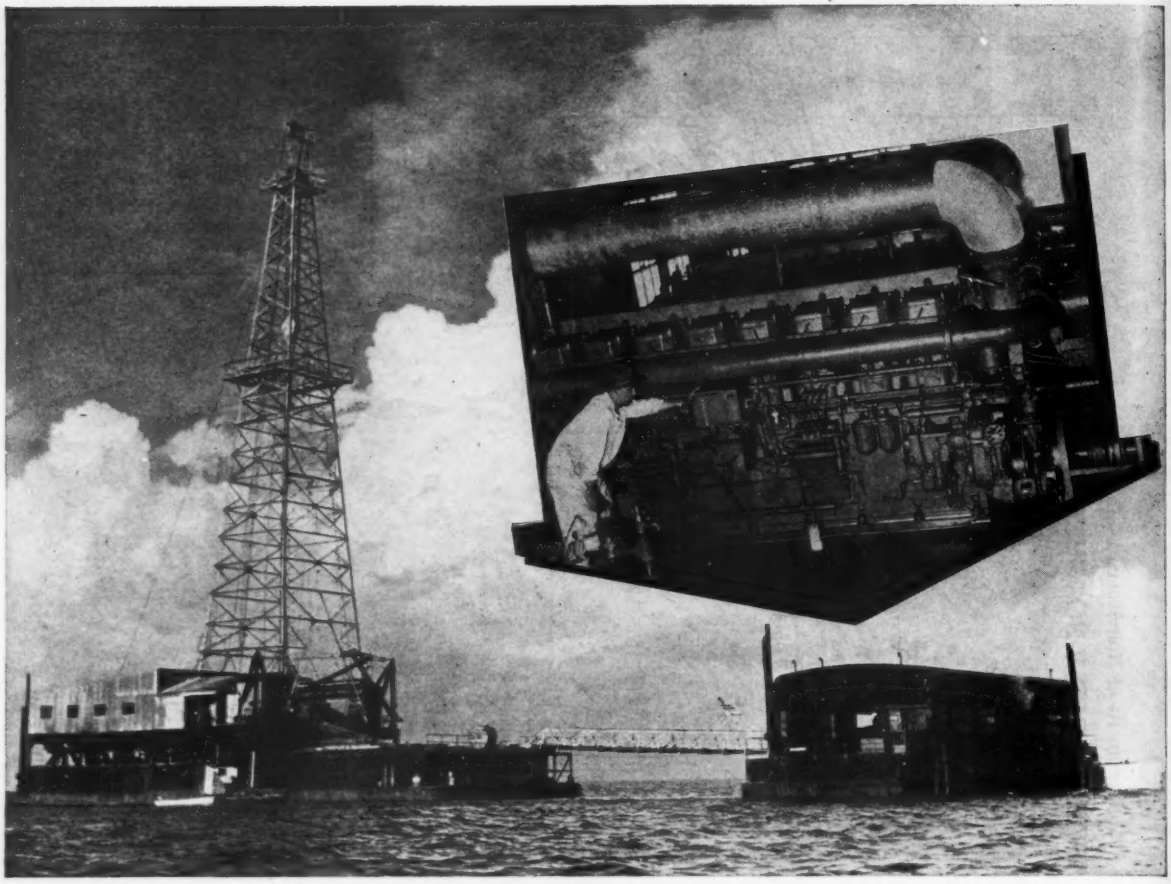


PIPE-LINE VELOCITIES



MAXIMUM ALLOWABLE VELOCITIES

COMMODITY	VELOCITY	REMARKS
LIQUIDS	15 FT/SEC	0-20 FT. PIPE
	8 "	20-200 "
	5 "	200 & OVER
PUMP SUCTIONS	12 "	MAXIMUM
	5 "	DESIRABLE
GAS	150 "	MAXIMUM
	80 "	STEADY FLOW
	35 "	PULSATING FLOW
VAPORS	80 "	CONDENSING
	50 "	GAS COOLERS



COOPER-BESSEMER DIESELS
help reach miles under Galveston Bay

Designed for drilling to 15,000 feet, this over-water drilling rig shown here is one of the largest and most powerful in operation today. It embodies the most modern developments in equipment and controls.

Fully in keeping are the three 8-cylinder, turbo-supercharged Cooper-Bessemer Diesels in the 100 ft. power barge at right. Each of these modern engines, rated 700 bhp, drives a 375 kw and a 60 kw generator for all of the many power requirements.

Electro-hydraulic governors automatically maintain the lowest possible engine speed as load demand varies, minimizing engine wear and fuel consumption. The 60 kw generators have Thyrite-controlled exciters to hold voltage constant despite variable speed.

Ordinary or unusual, small or large, your power requirements can always be met with exceptional effectiveness by ever dependable Cooper-Bessemers.

The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington Bradford, Pa.
Parkersburg, W. Va. San Francisco, Calif. Houston, Dallas, Greggton, Pampa and Odessa, Texas
Seattle, Wash. Tulsa Shreveport St. Louis Los Angeles Caracas, Venezuela

NATURAL GAS

Natural Gas Pipe Line Files Allocation Plan

WASHINGTON.—The Federal Power Commission has accepted for filing effective May 19 service rules providing for allocation of the system capacity of the Natural Gas Pipeline Co. of America to its customers in Nebraska, Kansas, Wisconsin, Illinois, and Iowa.

The rules represent the first attempt made by a natural-gas pipeline company to establish a permanent basis for the allocation of available gas to customers. They provide for changes in system capacity and establish the maximum amounts of gas which each distributor may expect on a peak day.

Under the rules, the pipe-line company will submit periodic information to each buyer relative to estimated maximum daily quantities of natural gas to be available to him during the following year. Provision has also been made for new customers. The 1947-48 capacity available for allocation is estimated at 400,100,000 cu. ft. per day.

The company's customers and state regulatory commissions were given an opportunity to make comments concerning the rules before their acceptance by FPC. The rules become a part of the rate schedules under which the company operates.

FPC Report Shows Gains In Gas-Industry Activity

WASHINGTON. — Operating revenues of natural-gas companies reporting to the Federal Power Commission amounted to $207,322,334 for the first quarter of 1947, an increase of 22.2 per cent over the $169,699,038 for the comparable 1946 period.

Gas operating-revenue deductions were $155,677,485, up 23.6 per cent. Of this, operating expenses accounted for $113,288,973, up 30.1 per cent; depreciation and amortization for $15,808,783, up 6.2 per cent; and taxes for $26,579,729, up 10.7 per cent.

Gas sales to ultimate consumers in the first quarter of 1947 were up 14.1 per cent over the first quarter in 1946. Revenues from such sales increased 18.1 per cent and amounted to $108,226,445. Sales to residential consumers increased 25.9 per cent and to commercial and industrial consumers 25.8 per cent and 10.9 per cent, respectively.

Southern Natural Given FPC Construction Permit

WASHINGTON.—The Federal Commission has granted Southern Natural Gas Co. an interim emergency certificate authorizing construction of facilities to increase its pipe-line capacity by 39,000,000 cu. ft. daily. Present line capacity is 255,000,000 cu. ft. daily.

This construction includes installation of a total of 8,000 hp. in four existing main-line compressor stations, an aggregate of 18½ miles of 20 and 22-in. loop line, and gas cooler, headers, valves, and other appurtenances. These facilities do not include any extensions of the company's system to new markets and comprise only construction planned for 1947, FPC said.

T. G. & T. Proposes New Company as Successor

WASHINGTON. — A proposal that Tennessee Gas Transmission Co. become the successor and operator of the Tennessee Gas & Transmission Co. system through consolidation proceedings has been filed with the Federal Power Commission.

The new company, the application states, has been incorporated in Delaware and has been formed solely for the purpose of acquiring and operating existing facilities and facilities now under construction by Tennessee Gas & Transmission Co., a Tennessee corporation. The new company proposes to conduct the operation of the consolidated companies in all respects as operation has been carried on by Tennessee Gas & Transmission.

Western Natural Gas Formed From Merger

Merger of Western Gas Co. and Gulf States Oil Co. has been announced by Paul Kayser, Houston, president of both firms.

Western Gas formerly was a wholly owned subsidiary of El Paso Natural Gas Co. The merged corporation will be known as Western Natural Gas Co. Kayser will be president. The merged company has extensive natural-gas holdings in Texas and New Mexico and is embarking on an active campaign for the development of additional reserves, Kayser said.

Carbon-Black Production Gains 18 Per Cent in 1946

Carbon-black production and sales were in record volume in 1946, responding to larger demand from all classes of domestic and foreign consumers, according to the Bureau of Mines.

Production of 1,244,421,000 lb. exceeded the 1945 record by 18 per cent but was below total sales that expanded 24 per cent over 1945 to 1,269,740,000 lb. The annual Bureau of Mines report is summarized in the accompanying table.

1946 CARBON-BLACK STATISTICS
(Quantity figures in 1,000 lb. except as noted)

	1945	1946
Producers reporting	21	22
Plants	59	60
Production:		
Louisiana	168,229	191,857
Texas:		
Panhandle district*	541,464	596,678
Rest of state	179,974	234,172
Total Texas	721,438	830,850
Other states (Calif., Kans., N. Mex., Okla.)	163,131	221,714
Total U. S.*	1,052,798	1,244,421
By processes:		
Contact	538,539	619,109
Furnace*	514,259	625,312
Quantity sold, domestic:		
Rubber companies	804,386	941,464
Ink companies	22,824	29,561
Paint companies	7,421	9,312
Miscellaneous	11,631	18,318
Total	846,262	998,655
Exports	173,773	271,085
Total sales	1,020,035	1,269,740
Losses	1	458
Producers stocks Dec. 31:		
Contact types	64,956	17,006
Furnace types	37,049	59,222
Total	102,005	76,228
Value at plants:		
Total	$42,323,000	$59,988,000
Avg. per lb., cents	4.02	4.82
Est. quantity of natural gas used, M.c.f.	431,830,000	478,349,000
Avg. yield per M.c.f.	2.32	2.44
Avg. value per M.c.f., cents	2.28	3.02

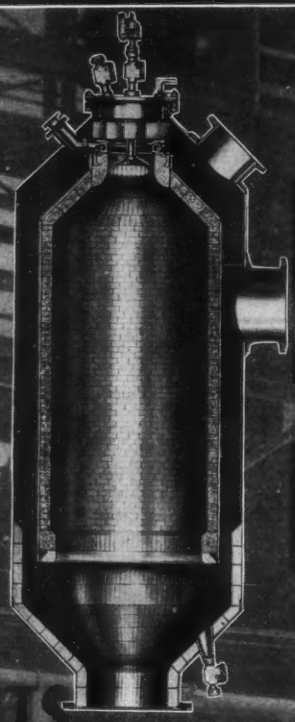
*Includes carbon black produced from liquid hydrocarbons.

Application Change Asked

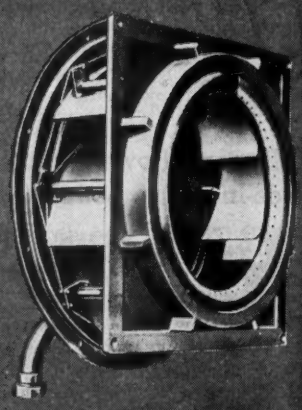
WASHINGTON.—United Gas Corp. has filed with the Federal Power Commission a motion asking that Atlantic Gulf Gas Co., a subsidiary of United, be substituted as the applicant for a certificate authorizing construction and operation of a $57,126,000 natural-gas pipe-line system extending from near Hattiesburg, Miss., through Alabama, Georgia, northern Florida, and southeastern South Carolina.

PEABODY

DIRECT-FIRED AIR HEATERS FOR CATALYTIC CRACKING UNITS



TYPE MU GAS and OIL BURNERS FOR OIL REFINERY FURNACES



Write for descriptive literature.

PEABODY ENGINEERING CORPORATION

580 FIFTH AVENUE • NEW YORK 19, N. Y.

ATLANTA, GA. BOSTON, MASS. CHICAGO, ILL. CLEVELAND, O. DENVER, COLO. DETROIT, MICH. HONOLULU, T.H. HOUSTON, TEX. KANSAS CITY, MO. LOS ANGELES, CALIF. NEW ORLEANS, LA. PHILADELPHIA, PA. PORTLAND, ORE. SAN FRANCISCO, CALIF. ST. LOUIS, MO. ST. PAUL, MINN. SEATTLE, WASH.

MONTREAL, CAN. MEXICO CITY, MEX. BUENOS AIRES, ARGENTINA

PEABODY LIMITED, LONDON

REFINING

Market Competition Demands Modernization

PROFITS reported by many oil-refining companies, both large and small, give an entirely erroneous picture of the financial position of the refining industry, L. H. Harvison, executive vice president of The M. W. Kellogg Co., said June 20.

Addressing a luncheon meeting of science editors at the company's Jersey City laboratories, Harvison said "the misconception is due to the fact that many people see only one side of the picture."

"We must keep in mind that just to maintain product quality at competitive levels, most refiners today are undertaking a substantial modernization program," he declared. "Some idea of the magnitude of their individual shares in this industry-wide program can be gained from the $3,000,000,000 figure cited by Dr. Robert E. Wilson, board chairman, Standard Oil Co. (Ind.), as the yearly expenditure required for the next few years to bring all phases of the petroleum industry up to date.

"We must remember that, due to war interruptions, there has been no major modernization to meet commercial market needs, for 5 years. Even this big task of catching up with 5 years technical advance in a single modernization program, would not be too serious, if the nation's economic picture was normal. However, the rapidly rising scale of costs through these recent years has created an abnormal financial situation for oil companies. For example, just 10 years ago, the most modern refinery you could build required an investment of less than $8 per gallon of daily gasoline output. Today that investment figures in the neighborhood of $25—an increase of more than 300 per cent. It is evident . . . that high present-day profits are absolutely necessary to make up the difference in investment costs."

Texaco Expansion in Casper Near Completion

Additions to The Texas Co.'s Casper, Wyo., refinery, involving several million dollars, are nearing completion and should help, in some measure, to ease the current tight supply situation in the Midwest and Northwest, according to M. Halpern, Texaco vice president in charge of refining.

Construction of major units is expected to be completed by July 1. Six new units, all of the most modern design, include crude topping and vacuum-distillation equipment, Fluid catalytic cracking facilities, naphtha reformer, catalytic polymerization unit, and asphalt converters. In addition, present gasoline and light-oil treating facilities are being expanded to handle the plant's increased output.

Standard High Bidder On Richmond Refinery

A $21,214,949 refinery at Richmond, Calif., has brought a high bid of $5,355,000 from Standard Oil Co. of California, it has been announced by the War Assets Administration.

The plant was constructed during the war to produce 100-octane gasoline. United Owners of America, a Nevada corporation, was the only other bidder with an offer of $3,000,000 on condition it could sell stock to finance the transaction.

Bay Petroleum Buys U.S. Facilities at Denver

WASHINGTON. — Sale of a Government-owned gas-concentration unit and two high-pressure storage tanks to Bay Petroleum Corp., Denver, for $46,000 cash has been approved by War Assets Administration.

The facilities are located on two small, Government-owned parcels of land within the site of Bay's 5,000-bbl. Denver refinery and are completely integrated with the corporation's facilities. They were sponsored by the Petroleum Administration for War for the production of butane-butylenes to supply feed stock for the alkylation unit at the Frontier Refining Co., Cheyenne, Wyo. Bay is paying appraised fair value of the property, exclusive of personal property, and plans to use the equipment for the installation of a polymerization unit in the Denver refinery, WAA said.

Foundation Work Begun For New Carter Refinery

Sinking of foundation piling for the Carter Oil Co.'s new 20,000-bbl. refinery east of Billings, Mont., was

. . . there is only ONE original EXCEL-SO way to deliver Dry, Safe, Clean fuel . . .

EXCEL-SO

You are not gambling when you use the EXCEL-SO separator/filter in the cleaning of petroleum products streams. This separator/filter, the ORIGINAL and only EXCEL-SO, eliminates water, debris, and other foreign matter with an efficiency of 99.999 percent.

Through EXCEL-SO's amazingly efficient elimination of water and contaminating elements, you are assured of MAXIMUM PERFORMANCE, and MINIMUM SERVICING and REPAIRS of valves, gauges and allied equipment.

Write for Additional Information

WARNER LEWIS COMPANY
(FLOTROL SYSTEMS INC.)
BOX 3096 • TULSA, OKLAHOMA

LEADING CONTRACTORS PREFER
Sterling
PUMPS • HOISTS • LIGHT PLANTS
DEPENDABLE
RUGGED
SIMPLE
•
SAVE
MONEY
SAVE
TIME
EASY
TO
OPERATE
•
WRITE
FOR
CATALOG
STERLING QUALITY
STERLING
MACHINERY CORPORATION
405-13 SOUTHWEST BLVD. KANSAS CITY 10, MO.

started last week. Contractors hope to have all 1,800 reinforced piling in place by November. This marks the first step in actual construction work for the new plant, although thousands of tons of earth have been moved in preparing the 344-acre site. The refinery, scheduled for completion late in 1948, will be the largest in the Rocky Mountain states.

It will include catalytic cracking and auxiliary facilities. In operation at normal capacity, the refinery will produce daily approximately 366,000 gal. of aviation, premium, and other grades of gasoline, 1,400 bbl. of asphalts, and 3,000 bbl. of various fuel oils. Other products will include kerosene, tractor fuels, diesel fuels, and heating oils. Storage capacity for 1,600,000 bbl. is being provided on refinery grounds for 35 different grades and types of products in 85 tanks of varying sizes.

Cooperative Makes 152-Day Run With Dubbs Unit

A 152-day run for the two-coil Dubbs unit at the Coffeyville, Kans., refinery has been announced by Louis C. Brown, chief engineer, Cooperative Refinery Association.

During this period, the unit was charged with 600,000 bbl. of reduced crude. The average run of the Coffeyville unit for the past 3 years has been 133 days.

In addition to this run with the two-coil unit, the cooperative has just completed a 125-day run with a 2,000-bbl. daily single-coil Dubbs at its Phillipsburg, Kans., refinery.

Shell Building Facilities To Make Hexylene Glycol

Construction of facilities for the manufacture of petroleum-derived hexylene glycol is under way at the Houston plant of Shell Chemical Corp., according to B. M. Downey, plant manager.

Full production is expected early in 1948. This plant, being built by M. W. Kellogg Co., is an addition to the $25,000,000 expansion program previously announced for Shell Chemical. Major uses of hexylene glycol are as a component of hydraulic brake fluids, in the manufacture of printing inks, and as a coupling agent or penetrant in textile processing. Other uses under investigation are as a component of engine cleaners, soluble oils, prespotting soaps, grinding aids, and adhesives.

General Petroleum to Erect Industrial-Relations Building

General Petroleum Corp. has announced plans for immediate construction of the first unit of an industrial-relations building at its Torrance, Calif., refinery. The initial segment will contain 5,000 sq. ft. of floor space and cost approximately $100,000. Ultimately it will be expanded to a total of 8,000 sq. ft., the company stated.

The building will house a complete industrial hospital as well as a complete industrial-relations organization for the company's manufacturing unit at Torrance.

Brazilian Firm Orders 12 Diesel-Electrics

Central Railroad of Brazil has placed an order for 12 1,500-hp. diesel-electric locomotives for freight service. Robert B. McColl, president of American Locomotive Co., said the locomotives will be delivered in May 1948.

Shipment of other heavy road and freight locomotives to Europe and other Latin American countries will start within the next year, he said. He predicted that export of diesel-electric locomotives to foreign railroads would be on a large scale within 2 years.

MATURED
MECHANICAL ENGINEER

Supervisory Position
Chemical Plant Design

A graduate mechanical engineer is wanted who is approximately forty years of age and who is capable of supervising equipment and process design for chemical plants. The work will be in the organic chemical field and some experience in the Petroleum or Synthetic Rubber Industry would be helpful. The position involves the supervision of an engineering department on the Middle Atlantic Seaboard, and carries with it important responsibility. Future possibilities are excellent.

First letter should contain full particulars as to age, education and experience.

ADDRESS REPLIES TO
BOX B-778
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

• RECYCLING
• REFORMING
• CRACKING
• TOPPING
THE HEART OF ANY PLANT..
BORN UPFLO HEATERS
• Lower Construction Cost
• Lower Operating Cost
• Higher Efficiencies
• Less Ground Space
• Longer Life
BORN ENGINEERING CO.
TULSA, OKLAHOMA

INDUSTRIAL
OIL AND GAS
BURNING
EQUIPMENT
NATIONAL AIROIL
BURNER CO., INC.
1236 E. Sedgley Ave., Philadelphia 34, Pa.

Experience

THAT EXTENDS TO EVERY DETAIL OF

COMPLETE PORTABLE PUMPING UNITS

It takes many ingredients to fashion a complete portable pumping unit, but none more important than knowledge and know-how . . . Gaso supplies these in generous measure . . . No company has had more comprehensive or varied contact with the particular conditions that exist in the oil industry . . . None can point to a more impressive record of high-efficiency, low-cost and trouble-free performance.

Gaso experience extends beyond the pump and power unit to every part of the complete assembly—including such details as ventilated battery boxes, V-belt guards, specially built tool boxes, etc.

You are sure of the utmost in pumping results when you make Gaso your first source of supply for complete portable pumping units.

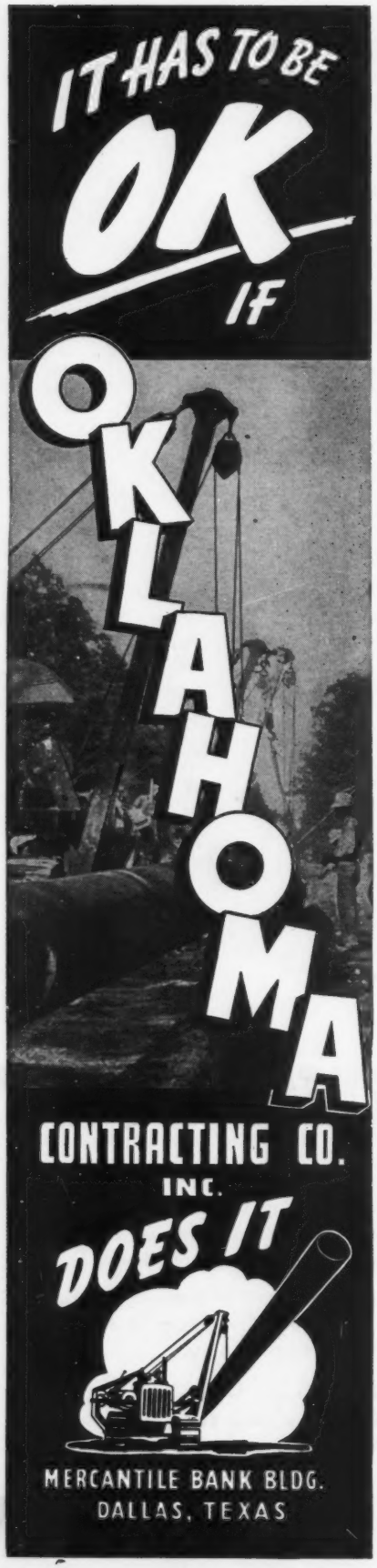
GASO PUMP & BURNER MFG. CO.

902 EAST FIRST ST., TULSA, OKLA. *Export Office:* **149 Broadway, New York**

Shreveport: W. L. SOMNER CO., 419 Lake Street • *Los Angeles:* PRODUCTION EQUIPMENT CO., Inc., 651 E. Gage Ave.

GASO PUMPS

for every oil industry need



PIPE LINES

Centrifugal Compressors Proposed by T. G. and T.

WASHINGTON.—Tennessee Gas & Transmission Co. has filed with the Federal Power Commission a request for temporary authorization to construct near Morehead, Ky., a new experimental compressor station consisting of centrifugal compressors driven by induction electric motors. Construction of the station is to start immediately and be completed by December 1.

By installation of the proposed compressor station, capacity on the north end of T. G. & T. system would be increased substantially, the company said, and would make additional gas available to relieve the prospective gas shortage in the Appalachian area during the coming winter.

In the new compressor station there would be installed one unit of three 3,600 r.p.m. centrifugal compressors in series, with each centrifugal compressor driven by a squirrel-cage induction electric motor. The capacity of the station would be approximately 350,000,000 cu. ft. a day, requiring 5,500 hp. of compression. Cost has been estimated at $477,000.

The company said: "Applicant's executives and engineers have made a careful study of the possibilities of temporarily increasing the capacity of its system by the installation of the compression-station facilities herein proposed, and have concluded that, while such facilities may still be considered in the experimental stage, nevertheless it is feasible to undertake the construction, particularly from the standpoint of the advantages to be obtained by increases in capacity if successful."

Half-Way Mark Reached On California Gas Line

Work is proceeding on schedule on the 214-mile Blythe-Santa Fe Springs, Calif., 30-in. natural-gas line with the job a little better than half done, according to the Southern California Gas Co.

Southern California and Southern Counties Gas Co. have two spreads working on this record-size line. Spread 1, which started at Blythe in March, is a few miles east of Indio, having completed some 87 miles. Spread 2 began pipe laying the last week of April and is now working near Corona. This crew has installed around 23 miles of pipe.

The pipe-fabrication job for the entire 214 miles of line has been completed and all the pipe is in the field, ready for installation.

Progress is reported equally sat-

This picture is a striking illustration of the huge size of the 30-in. pipe being laid on the "Biggest Inch" line from Blythe-Santa Fe Springs, Calif. It also gives an indication of the many problems involved in handling and fabrication. Here the pipe is being spotted along the route of the line by large standard tractor equipment. Construction is now complete on about half of this 214-mile line, and all pipe has been fabricated and spotted along the route

FOR **POSITIVE**
CORROSION CONTROL
on
Reconditioning Projects
and
New Lines

OWENS-CORNING
FIBERGLAS
Underground Pipe Wrap

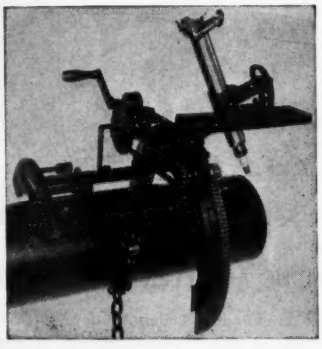
- Non-Corrosive
- Moisture Resistant
- Acid Resistant
- Heat Resistant
- Reinforces Coatings

Let us furnish information or specifications concerning this material and its application on your present or future projects.

Large Warehouse Stocks at
Chicago — TULSA — Houston

MIDWESTERN
ENGINE & EQUIPMENT CO., INC.
Phone 3-4113 Tulsa 3, Okla.

Cut & Bevel Any Pipe
With
***Maximum* SPEED**
***Minimum* COST**



The H & M PIPE CUTTING and BEVELING MACHINE

SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.
ECONOMY: Save approximately one-half labor and gas costs.
PORTABILITY: Can easily be carried from one pipe section to another.

Write for Literature

The H & M
Pipe Beveling Machine Co.
611 Petroleum Building, Tulsa, Oklahoma

isfactory on the 26-in. Dumas, Tex.-Blythe line which El Paso Natural Gas Co. is laying to connect with the California section. The bridge across the Colorado River has been completed, and pipe pulled across.

Four Projects Under Way By Vaughn & Taylor

Two jobs have been commenced, another is about half completed, while a fourth is awaiting arrival of pipe in the current program of Vaughn & Taylor, pipe-line construction company, Wichita Falls, Tex.

In addition the company has recently completed two other projects.

Under contract by the company: Taking up approximately 3,500 ft. of 3-in. and laying approximately 5,500 ft. of 3-in. for Sinclair Refining Co., pipe-line department, near Dallas. An existing gasoline line is being retired and rerouted along Hines Boulevard. H. H. May is in charge of this recently commenced project.

Doping and laying 18,000 ft. of 3-in. in Butler County, Kansas, for Phillips Petroleum Co. Begun May 15, this project was delayed by rains and is about half completed. R. L. Taylor is superintendent.

Laying approximately 24,000 ft. 20-in. residue gas lines and 6 miles of 6-in. gas-gathering lines for Shamrock Oil & Gas Corp. near its Dumas, Tex., plant. D. D. Vaughn is superintendent for this recently commenced job.

Laying 35-mile gathering system for Phillips near Eunice, N. M. Size of lines ranges from 4 to 20-in. Line completed, including drips and meters, except about 12,000 ft. of 20-in. which has not arrived. Jess Moore is superintendent.

Vaughn & Taylor's recently completed projects are:

Nine miles of 8-in. extension loops for Phillips Petroleum in Butler, Greenwood, and Coffey counties, Kansas. D. D. Vaughn and R. L. Taylor were superintendents.

Construction of discharge lines to Petersburgh, Anton, and Irish pools in West Texas for Stanolind Pipe Line Co., involving 110,908 ft. of 6-in. H. B. May and T. D. Vaughn were in charge.

Portland-Montreal Line To Double Capacity

Portland Pipe Line Corp. is planning to build a new 20-in. line, as soon as materials are available, doubling the capacity of its present Portland, Me.-Montreal pipe line, according to Frederick C. Schultz, president.

Recent improvements have stepped up capacity from 61,000 to 71,000 bbl., and installation of new pumps will add another 10,000 bbl. within 6 months. The contemplated 20-in. line

"Everything for the Pipeliner"

PIPE COATING and WRAPPING MACHINES
Stationary and Line Traveling

PIPE CLEANING and PRIMING MACHINES
Stationary and Line Traveling

American Steel Works
HEATING KETTLES

PIPE LINE SUPPLIES AND EQUIPMENT

PERRAULT *Brothers* INC.
1130 NORTH BOSTON
TULSA 6, OKLAHOMA
Phone 5-1104

MOLE
Pipeline Cleaner

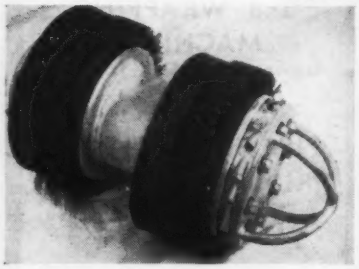
For BETTER cleaning of
CRUDE LINES
PRODUCT LINES
NATURAL GAS LINES

FOR DETAILS WRITE

Pipeline Cleaners Co.
Fort Madison, Iowa

WRITE FOR LATEST INFORMATION

TYPE RCN
"JET ROTATION"
PIG



FOR CLEANING
NATURAL GAS PIPE LINES

- Compactly built — will traverse short-radius bends.
- By-pass gas sweeps ahead loosened dirt, rust, mill scale.
- Gas stream emerging from nozzles causes gradual rotation.
- Alternate nozzles plugged when limited supply of gas available for line cleaning.

SIZES 6" to 14" — similar design in sizes 16" and larger.

Refer to Dept. J

THE PIG WITH THE POKE
CLEANS PIPE LINES
T. D. WILLIAMSON, INC.

DEPENDABLY
PROTECTED
with Reilly
PIPE ENAMEL

REILLY TAR & CHEMICAL
CORPORATION
Merchants Bank Bldg., Indianapolis
500 Fifth Ave., New York • 2513 S. Damen Ave., Chicago
17 Plants to Serve the Nation

will boost the line to 120,000 bbl. daily.

The line was built during the war by Standard Oil Co. (N. J.) to permit the continuous supply of crude to Montreal refineries on a year-around basis. Previous to the construction, freezing over of the St. Lawrence River in winter prevented tankers from reaching Montreal.

Four Canadian companies joined together after the war and formed Portland Pipe Line Corp., as a subsidiary, to buy the line. They also acquired all outstanding stock of Montreal Pipe Line Co., Ltd., which operated a pipe line from the international boundary near North Troy, Vt., to Montreal East. The four Canadian companies were: British American Oil Refining Co., Imperial Oil, Ltd., McColl-Frontenac Oil Co., Ltd., and Shell Oil Co., Inc.

FPC Authorizes $6,762,691 Program of C.G.&E. Group

WASHINGTON.—The Federal Power Commission has issued certificates of public convenience and necessity to four affiliates of the Pittsburgh group of the Columbia Gas & Electric Corp., authorizing them to construct, acquire, rearrange, and operate facilities for the transportation and sale of natural gas in West Virginia, Ohio, Pennsylvania, New York, and Maryland.

The companies, Home Gas Co., The Manufacturers Light & Heat Co., Cumberland & Alleghany Gas Co., and Natural Gas Co. of West Virginia, estimate over-all cost of the projects at $6,762,691. The main construction authorized is a 130-mile 14-in. line from a junction on the main line of Manufacturers at Coatesville, Pa., to a point on Home's line near Port Jervis, N. Y. *(For additional details, see The Oil and Gas Journal, February 22, page 188.)*

Kansas Runs Set Record

Kansas pipe-line runs in the week ended June 16 reached their highest point in several years at 294,170 bbl. daily. The figure represented a gain of 13,673 bbl. daily over runs of the preceding week. Previous high for 1947 was 291,507 bbl. daily in the week ended May 26.

Leduc Line Planned

EDMONTON, Alta.—Imperial Oil, Ltd., is planning to run a pipe line from the new Leduc field to Nisku, on the Canadian Pacific Railway, a distance of 6 miles, according to reports current here.

The new Leduc field is Canada's most promising discovery in several years. Completion of the fourth producer earlier this month proved an area 3¼ by 1 mile in size.

CALL FOR
SPEED AND
EFFICIENCY

Now on Morrison Bros. spreads are two-way radios . . . saving countless time, money and material. This communication between superintendent and gangs keeps the organization in constant contact with each other for split-second action. Contract with MB for Pipeline Perfection.

MB

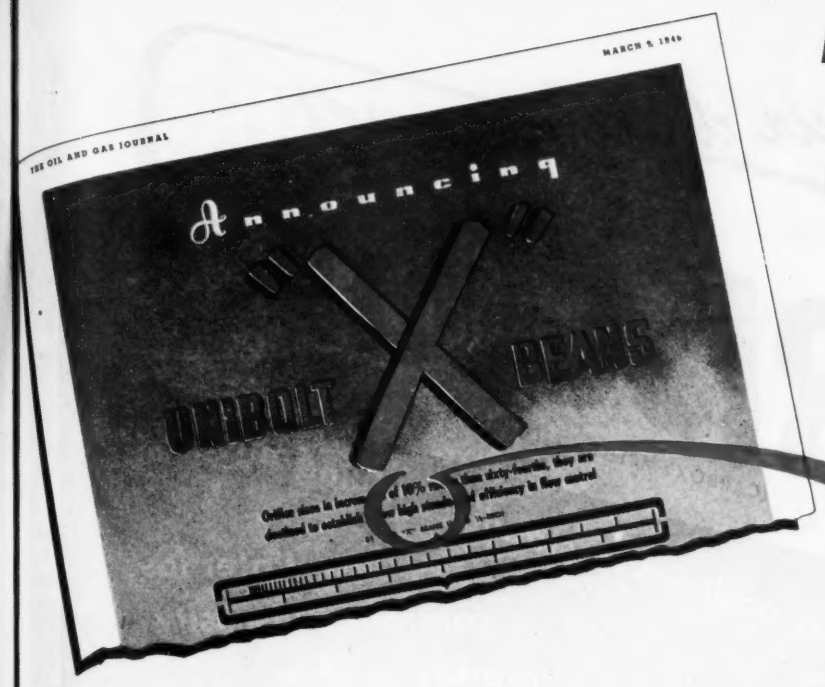
MORRISON BROS.
CONSTRUCTION CO. INC.
P. O. BOX 4106 ODESSA, TEXAS PHONE 1640

SPEED • SATISFACTION
SERVICE

DOING A BETTER PIPE LINE JOB!

Better prepared to undertake any job in pipe line construction. Complete, modern equipment, experienced personnel, and a personal pride in giving you complete, satisfactory service in the shortest possible time—that's why we're doing a better pipe line job! When you plan your next pipe line, give us a call.

VAUGHN-TAYLOR
CONSTRUCTION CO.
Builders of Better Pipe Lines
318 HAMILTON BLDG BOX 1351 PHONE 2-1821
WICHITA FALLS • TEXAS



And now by Popular Demand

UNIBOLT X BEANS

IN INCREMENTS OF

5%

OF WELL FLOW

. . . And 22 Additional Sizes Of Renewable Inserts Up To "X-40"

NOW, 72 SIZES OF CHOKES under ½-inch!

The immediate acceptance of UNIBOLT "X" BEANS attests to the long felt need for in-between-sizes of chokes to provide more precise control of well flow. Before the advent of UNIBOLT "X" BEANS, only 8 sizes of positive chokes, drilled in increments of 1/64", were available up to ⅛"—the most popular orifice range for producing under proration rules. This limitation in orifice selection posed a problem for production men for, as a general rule, a well will either over-produce or under produce on a standard 1/64" increment positive choke, and frequently it is impossible to obtain the most favorable gas/oil ratio.

UNIBOLT "X" BEANS, drilled in increments of 10% of well flow, and providing 31 orifice sizes below ⅛", were introduced approximately one year ago. And while this wide orifice selection provided precise flow control of most wells, it was found that an even smaller orifice increment would be still more desirable . . . particularly in the larger size range of "X-28" to "X-40." Special equipment has been obtained and a manufacturing technique developed to drill positive beans in increments of only 5% of well flow. These split orifice sizes are designated as "X-285," "X-29," "X-295," etc.

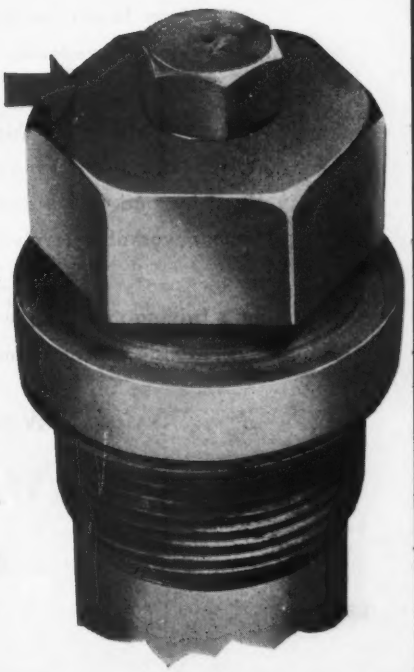
Now, as a result of numerous requests, UNIBOLT "X" BEAN INSERTS, which have proven so economical, are available in 52 sizes up to "X-40" (12/64").

THORNHILL-CRAVER COMPANY, INC.

HOUSTON, TEXAS

Replace the insert and save the bean. Inserts drilled in "X" sizes only, and up to size "X-40" (12/64").

UNIBOLT Positive Flow Beans are offered in fractional sizes (1/64" up) as well as "X" sizes (5% and 10% of well flow). They are machined to extremely close tolerances and properly heat-treated to assure long, trouble-free life.



Reduce your drilling cost!

DRISCOSE

(CARBOXYMETHYLCELLULOSE)

a valuable new additive to stabilize drilling muds

low water loss
controlled viscosity
readily soluble

Driscose effectively controls the properties of drilling muds. This unique additive is easy to use and yields excellent viscosities and gel strengths. Filter cakes are thin and strong. Driscose is odorless and tasteless and is immune to chemical or bacterial action.

DRISCOSE *is a new product . . . with new advantages!*

1 Water losses can be reduced to 4 cc or less with moderate amounts of Driscose.

2 Filter cakes are thin and strong. Thickness is in the range of 2/64" to 3/64". Viscosity and gel strength remain at satisfactory workable levels.

3 Drilling muds are more easily controlled in high concentrations of salt. Anhydrite sections can be drilled without the usual mud treating problems.

4 Bentonite and Bentonitic materials show little tendency to swell in Driscose solutions — especially when moderate quantities of salt are present. This aids in overcoming the difficulties of drilling in "heaving shale."

5 Electrologs can be run successfully with Driscose.

Write for location of nearest warehouse

DRILLING SPECIALTIES COMPANY

BARTLESVILLE, OKLAHOMA

Exploration and Drilling

Light Oil Strike Near Santa Maria

CALIFORNIA geologists have a problem on their hands, trying to figure the meaning of the new wildcat strike of Sunray Oil Corp. in 4-8n-33w, in the Santa Maria district of Santa Barbara County. As the well cleared up, it flowed 314 bbl. of 36.6-°gravity oil through a ⅛-in. choke in 24 hours, from casing perforations opposite a Miocene pay at 4,805-30 ft., with a gas-oil ratio of 540 cu. ft. The oil is classed as "sweet," although no complete sulfur test has been run as yet.

The new strike is fairly well surrounded by a cluster of fields in the Santa Maria district, all of which produce very low to low gravity oil with rather high sulfur content. In this district, Casmalia produces 10.3° gravity, 2.8 per cent sulfur oil; Cat Canyon 13.5°, 4.1 per cent; Gato Ridge 13.9°, 5.4 per cent; Lompoc 20.5°, 3.4 per cent; Orcutt 22.6°, 2.6 per cent; Santa Maria Valley 15.9°, 4.6 per cent sulfur.

Sunray's well is 1½ miles southeast of the nearest production in Orcutt field and 12 miles south of Santa Maria. The well is located on a 1,400-acre, 100 per cent Sunray lease, on a Los Flores Land & Oil Co. tract. Adjoining to the west, north, and south, Sunray and others have about 3,500 acres in a block on the Careaga ranch.

In 1945 Richfield drilled a 7,267-ft. dry hole about 2½ miles southeast of the present discovery. Earlier, in 1942, Standard Oil Co. of California drilled a dry hole to 5,601 ft. about 3 miles north of the discovery. The Standard well was about ½ mile from an old dry-hole cable-tool test drilled to 4,337 ft. in 1918 by Los Flores Land & Oil Co.

The new test was drilled with company tools, and Sunray gives credit to W. W. Porter II, consulting geologist, for geological work and assembling the acreage.

Careful production tests and reservoir-engineering studies will be made before any ambitious drilling campaign is planned. The high-gravity, sweet crude, while a pleasant surprise, also raises questions. It is is true that the nearest production, which appears to be at Orcutt, at 22.6° gravity, and 2.6 per cent sulfur content, is about the highest gravity and sweetest crude in the district. But it is quite a jump from 22.6° gravity to 36.3°, particularly in an area where the 22.6° gravity was already quite high.

KANSAS

Kansas City Lime Discovery in Ellis County

DARBY & BOTHWELL 1 Schermer, NE NE NW 4-12s-18w, Ellis County, swabbed 14 bbl. 30°-gravity oil per hour through perforations in Lansing at 3,434-38 ft. Plug was then set up the hole to test saturation at 3,370-78 ft., and after 1,000 gal. acid, well swabbed 28 bbl. 35°-gravity oil in 3 hours. Well is being put on pump. Drill cuttings showed saturation in 12 different zones in the Kansas City, which was logged at 3,337-3,579 ft. The hole was drilled to 3,661 ft. Simpson was logged at 3,638 ft., and Arbuckle at 3,646 ft. This test is 1½ miles south of the Riverview pool.

Great Lakes Carbon et al 1 Dirks, SW SW SE 16-18s-18w, Rush County, a potentially important pool opener, 12 miles west of the Otis gas field, swabbed 6 bbl. oil and 6 bbl. water per hour from Arbuckle at 3,838-65 ft. The hole was plugged back to 3,856 ft. and well then swabbed 7 bbl. oil per hour and no water. The well will be acidized.

Brunson-Adair 1 Howard, NW NW SE 15-22s-13w, Stafford County, will set plug to test Lansing saturation logged at 3,581-88 ft., after failing to get oil in commercial quantities in the Arbuckle. The well is located about 1½ miles southwest of production in the West Drach pool.

Stanolind Oil & Gas Co. 1 Stamper, SE SE NE 6-8s-17w, Rooks County, is running pipe to test the Arbuckle, topped at 3,300 ft. Drill-stem test 4 to 21 ft. in the Arbuckle recovered 25 ft. mud with trace of oil. This test is about 5 miles north of the Dopita pool.

KANSAS SUCCESSFUL WILDCATS

Barton County: Kansas-Nebraska Gas Co. 1 Unruh, NW NW NW 16-20s-15w, 10,200,000 cu. ft., pay 3,747-63 ft. in Arbuckle, Lansing 3,545 ft., Arbuckle 3,734 ft., TD 3,763 ft.

McPherson County: Westgate and Greenland et al 1 Robinson, NW NW SE 31-17s-1w, IP 160 bbl., pay 2,665-72 ft., in Mississippi lime, Lansing 2,100 ft., Mississippi 2,665 ft., TD 2,672 ft.

Stafford County: Virginia Drilling Co. 1 Graw, SE SE NW 14-21s-12w, IP 87 bbl., pay 3,550-80 ft., in Arbuckle, Lansing 3,229 ft., Sooy 3,464 ft., Viola 3,470 ft., Simpson 3,498 ft., Arbuckle 3,539 ft., TD 3,580 ft.

KANSAS WILDCAT FAILURES

Barber County: Wakefield 1 Rolf, NW NW SW 5-30s-11w, dry at 4,839 ft., Lansing 3,859 ft., Mississippi 4,375 ft., Viola 4,610 ft., Simpson 4,700 ft., Arbuckle 4,791 ft.

Butler County: Cox & Burns et al 1 Golsch, NE NE SE 9-25s-4e, dry at 2,784 ft., Lansing 2,217 ft., Mississippi 2,729 ft.

B. and R. Drilling Co. et al 1 Johnson, NE NW NW 13-26s-3e, dry at 2,765 ft., Lansing 1,940 ft., Mississippi 2,725 ft.

Gatty 1 Rummel, NW NE NE 14-28s-3e, dry at 3,011 ft., Lansing 1,985 ft., Mississippi 2,710 ft., Simpson 2,966 ft., Arbuckle 3,000 ft.

Hagar 1 Leidy, SE SW SE 31-27s-6e, dry at 3,083 ft., Lansing 2,083 ft., Mississippi 2,764 ft., Simpson 3,080 ft.

Graham County: Royer and Farris 1 Jackson, NE NE NE 2-8s-23w, dry at 3,925 ft., Lansing 3,511 ft., Sooy 3,864 ft., Arbuckle 3,904 ft.

Kingman County: Gulf Oil Corp. 1 Calistra-State, NW NE NE 35-27s-9w, dry at 4,501 ft., Lansing 3,373 ft., Mississippi 3,981 ft., Viola 4,270 ft., Arbuckle 4,442 ft.

Aylward 1 Albritten, NE NE SE 17-28s-9w, dry at 4,544 ft., Lansing 3,531 ft., Mississippi 4,072 ft., Viola 4,344 ft., Simpson 4,389 ft., Arbuckle 4,511 ft.

Marion County: McBride 1 Dole, SW NW SW 7-19s-1e, dry at 3,498 ft., Lansing 2,205 ft., Mississippi 2,842 ft., Viola 3,331 ft., Simpson 3,409 ft., Arbuckle 3,469 ft.

Stafford County: Armer 1 Teiperman, NE NE NW 21-21s-12w, dry at 3,691 ft., Lansing 3,260 ft., Simpson 3,623 ft., Arbuckle 3,636 ft.

Sohio Oil Co. 1 Fair, SE SE SE 5-22s-11w, dry at 3,586 ft., Lansing 3,166 ft., Viola 3,467 ft., Simpson 3,504 ft., Arbuckle 3,552 ft.

Black and Marshall 1 Thole, NW NW NE 27-23s-12w, dry at 3,875 ft., Lansing 3,402 ft., Viola 3,717 ft., Simpson 3,790 ft., Arbuckle 3,863 ft.

Isern Brothers 1 Abbott, SE SE NW 25-24s-14w, dry at 4,249 ft., Lansing 3,621 ft., Viola 4,030 ft., Simpson 4,172 ft., Arbuckle 4,219 ft.

Trego County: Skelly Oil Co. 1 Hellman, NE NE NE 35-11s-22w, dry at 4,135 ft., Lansing 3,606 ft., Sooy 3,940 ft., Arbuckle 4,098 ft.

APPALACHIAN FIELD

Wildcat Test Abandoned In Cameron County

PITTSBURGH.—In North Strabane Township, Washington County, southwest Pennsylvania, Charles E. Young completed 3 E. G. Walker good for 1,500,000 cu. ft. gas from the Salt sand, total depth 1,385 ft. This is at the north end of the Young pool with Nos. 1 and 2 on this farm being oil wells from a lower sand. The Salt sand was logged at 1,208-1,320 ft. with the gas at 1,241 and 1,270 ft.The Maxton sand was topped at 1,370 ft. with total depth 1,385 ft.

In Valley Township, Armstrong County, the test of Boyd & Schupp on Frank Louster farm is good for 1,637,000 cu. ft. gas from a stray sand, total depth 1,170 ft.

In Gibson Township, Cameron County, north central part of the state, Godfrey L. Cabot, Inc. abandoned the wildcat on Pardee Estate, Warrant 5,947 at 3,187 ft.

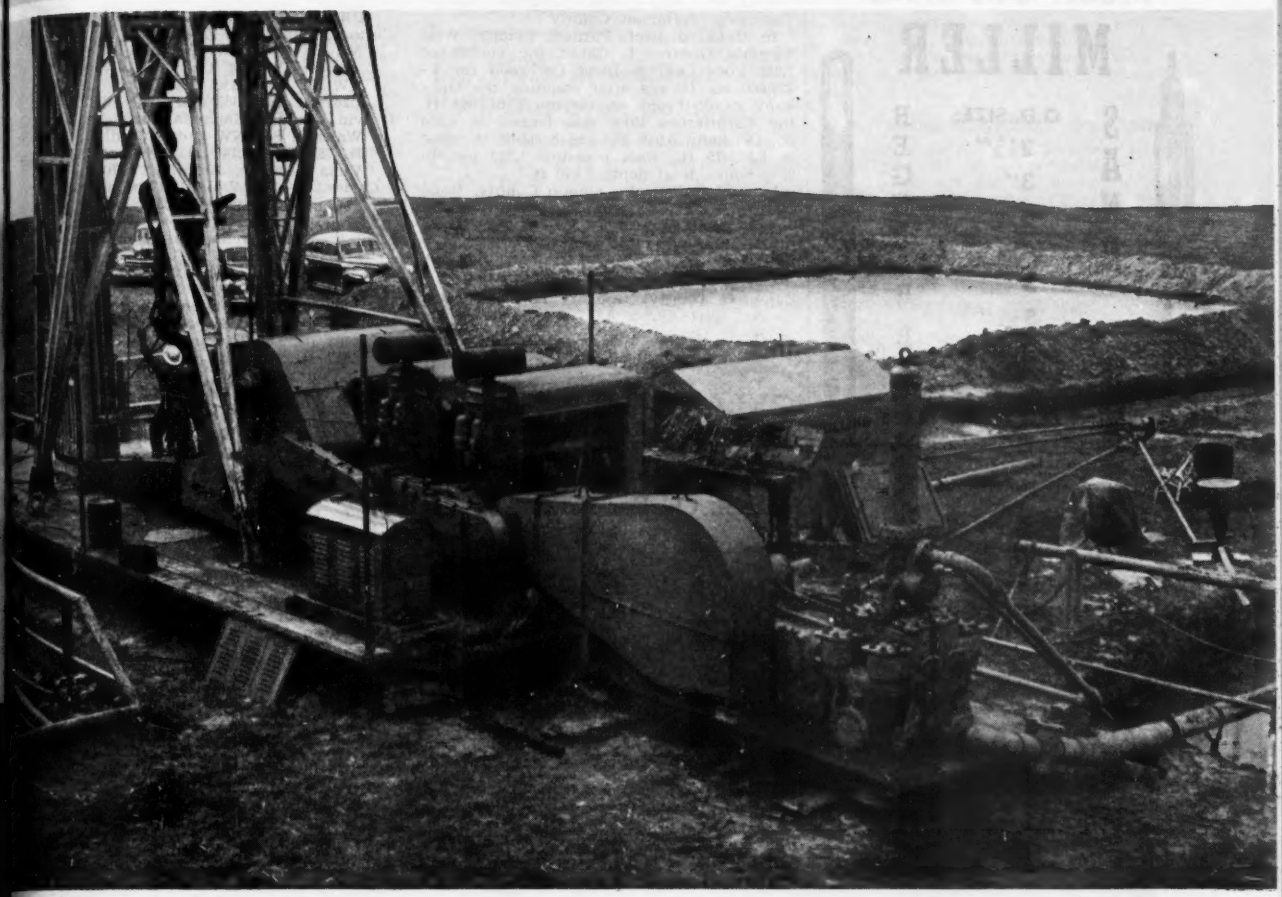
This Combination

This complete rig is the lowest in cost, the highest in quality, longest in life, fastest in drilling speed and lowest in moving expense of any comparable rig in the world. *Ask any owner for proof of these statements.*

Moving and rigging up of both the "Cardwell" draw works and mast are simple and fast. Streamlined single or twin-engine draw works leaves plenty of floor space for the crew. Lee C. Moore Jackknife masts are available with all "Cardwell" draw works, combination rotary and cable tool drilling rigs, and deep well servicing hoists.

Model S single engine draw works with Lee C. Moore mast

is Portability PLUS



Cardwell Model O Twin-Engine Draw Works with Lee C. Moore Mast, Owned by Robinson Drilling Company, Fairfield, Illinois

"Cardwell" Model O twin-engine draw works with chain type compounding makes it possible to transport draw works without removing engines. It is standard with "Caterpillar" D13000 or Waukesha WAK engines, and optional with "Caterpillar" D17000, Waukesha NKU, Buda PCD-1879, or two General Motor "Twins." These larger engines are standard with V-belt drives. With "Caterpillar" D13000 or Waukesha WAK, this twin-engine draw works is practical for 6,000-foot drilling, and with the larger engines to 8,000 feet, when additional power is used on the pump.

The "Cardwell" Model S, shown at left, is a fast, powerful single engine draw works for 5,000-foot drilling, or 10,000-foot workover jobs. "Cardwell" air clutches speed up operations and make possible more work with less effort. The "Hi-Lo" drive, usable in all five speeds of the even-step transmission, provides a high drive for fast block return, and a low for picking up the pipe without shifting gears.

Model S single engine draw works is available with engines up to 202 HP. Write for illustrated folder and prices.

Lee C. Moore Masts Are Sold by Cardwell Manufacturing Co., Inc.

CARDWELL MFG. CO. INC.

P. O. Drawer 2001 . . . Long Distance Telephones 128 – 129 – 130
Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York
Wichita, Kansas, U. S. A.

IMMEDIATE DELIVERY

ON MANY "CARDWELL" RIGS WRITE OR PHONE FOR INFORMATION

INCREASE PRODUCTION
Clean Out With
MILLER

SAND PUMPS

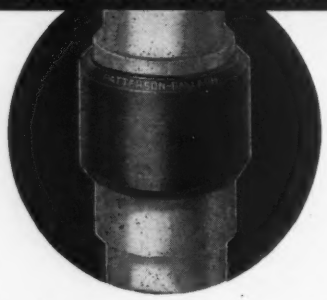
O.D. SIZES
2½"
3"
3½"
4¼"
5"
5½"
7"

LENGTHS
20'
25'
30'

REGULAR BAILERS

Miller Sand Pump Co.
General Office Box 4516
OKLAHOMA CITY 9, OKLA.
EXPORT OFFICE
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.
See Composite Catalog Page 2426

"Best Bet Yet"
SAVE YOUR TUBING!



Tubing collars worn by contact with casing steal the profit out of pumping. Patterson-Ballagh Plastic Tubing Protectors prevent both collar and casing wear. Oil-proof, wear-resistant, insulating. They are pressed onto the collar under pressure and will not come off. Made in all sizes. End your tubing troubles. CALL in your Patterson-Ballagh man.

Specify "Just Put 'Em On"
PATTERSON-BALLAGH
A Division of Byron Jackson Co.
PLASTIC
TUBING PROTECTORS

190 E. 65th Street, LOS ANGELES 1
931 Russ Bldg., SAN FRANCISCO 4
6247 Navigation Blvd., HOUSTON 11
808 Graybar Bldg., NEW YORK 17

as a dry hole. It did not reach the lower Devonian.

New locations in southwest Pennsylvania totaled four and in Patton Township, Allegheny County; Burrell and Rayburn townships, Armstrong County; Clover Township, Jefferson County.

In Union district, Putnam County, West Virginia, Godfrey L. Cabot, Inc. completed 1,232 Poca Coal & Land Co. good for 2,159,000 cu. ft. gas after shooting the Oriskany sand. From an elevation of 969 ft. the Corniferous lime was logged at 4,954 ft., Oriskany 5,049 ft., gas 5,062-63 ft., shot at 5,055-75 ft., rock pressure 1,730 psi. in 25½ hours, total depth 5,070 ft.

In Center district, Calhoun County, Hope Natural Gas Co. completed 9,102 C. A. Jarvis good for 969,000 cu. ft. gas from the Injun sand, total depth 1,894 ft.

PENNSYLVANIA WILDCAT FAILURE

Cameron County: Godfrey L. Cabot, Inc. No. 5,947, dry at 3,187 ft., did not reach lower Devonian.

OKLAHOMA

Wilcox Sand Well Flows 90 Bbl. Oil Per Hour

DERBY OIL CO. 1 Weigle, NE NE SE 2-21n-2w, Noble County, flowed 90 bbl. 42°-gravity oil in first hour, after cleaning out, through 2-in. tubing, from Second Wilcox topped at 5,133 ft. This test is located about midway between the Polo and Northeast Sams pools. The Polo pool produces from Layton and Wilcox and the Northeast Sams produces from the Misener.

Nixon Petroleum Co. et al 1 Warren, NE SE SE 1-5s-13w, Cotton County, filled up 120 ft. with oil overnight from Megargle lime at 1,594-1,615 ft. Total depth is 1,623 ft. This is a new producing zone for this area, the well being located in the southwestern part of Cotton County and 5 miles northeast of the Burkburnett pool across the river in Texas.

Continental Oil Co. et al 2 Greer, NW SW SW 24-23n-1w, Noble County, flowed 547 bbl. oil in 14½ hours. Production is from Bartlesville, topped at 4,356 ft. Total depth is 4,401 ft. This is the second producer in the Southeast Ceres pool, and offsets the pool opener to the north, and offsets a dry hole to the west, on 10-acre spacing.

In the East Lindsay pool, Sinclair Prairie 1 Harrison, NW NW 6-4n-3w, Garvin County, flowed 103 bbl. oil in 4 hours on drillstem test at 9,982-10,009 ft. This is the east offset, on 40-acre spacing to the pool opener. Pray & Bauman 1 Frankenburg, NW NE 7-4n-3w, which appears to be best well in the East Lindsay pool, flowed 120 bbl. an hour for 3 hours, in a recent test, through 14/64-in. choke and was then shut in to install larger gas separator. On 24-hour gage, the well made 1,428 bbl. through 9/64-in. choke. Production is through perforations at 10,000-60 ft. in basal Bromide and Tulip sand.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: R. L. Bauman Drilling Co. 1 Frankenburg, NW NE 7-4n-3w, IP 401 bbl., 41° gravity, pay 10,000-77 ft., TD 10,077 ft., Hunton 8,310 ft., Viola 8,960 ft., Bromide 9,460 ft., Tulip Creek 9,890 ft., McLish 9,955 ft.

R. L. Bauman Drilling Co. 1 Myers, NW NW 7-4n-3w, IP 225 bbl., 41° gravity, pay 9,840-10,105 ft., Hunton 8,490 ft., Viola 9,250 ft., Bromide 9,730 ft.

Logan County: Gulf Oil Corp. 1 Bliss, SE NW NE 26-17n-1e, IP 11 bbl., gravity 47.6°, pay 3,634-58 ft. Layton, TD 5,193 ft., PB 3,663 ft., Layton 3,632 ft., Cleveland 3,874 ft., Oswego 4,281 ft., Mississippi 4,685 ft., Wilcox 5,058 ft.

Seminole County: Gem Oil Co. 1 Rock, SE SE SW 32-6n-6e, IP 50 bbl., gravity 38.4°, pay 1,996-2,006 ft. in Lower Allen, TD 3,673 ft., PB 2,020 ft., Calvin 1,758 ft., Lower Allen 1,995 ft., Woodward 2,880 ft., Bromide 3,645 ft., 2nd Wilcox 3,663 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: G. T. Lackey 1 Wright, NE NE 28-2s-13w, dry at 2,100 ft.

C. & N. Drilling Co. 1 Rainwater, NW NW SE 35-4s-11w, dry at 2,107 ft., sand 1,261-71, 1,561-68, and 1,590-1,607 ft.

Garvin County: Magnolia Petroleum Co. 1 Walston, SW NW 29-2n-1w, dry at 7,456 ft., Hunton 6,149 ft., Sylvan 6,450 ft., Viola 6,700 ft., Bromide 7,170 ft.

Carter Oil Co.-Wolf 1 Gibson, NE NE SW 5-2n-2e, dry at 3,505 ft., Bromide 2,670 ft., McLish 3,360 ft.

Oil and Gas Industries 1 Hankins-Andrews, SE SE SE 24-4n-2e, dry at 3,247 ft., Belle City 2,290 ft., Viola 2,745 ft., Bromide 2,800 ft., McLish 3,168 ft.

McClain County: Magnolia Petroleum Co. et al 1 Mager, SW SE 35-8n-3w, dry at 9,463 ft., Dewey Lime 6,040 ft., Hunton 8,517 ft., Bromide 9,240 ft.

Noble County: Midco Oil Corp. 1 McCrary, SE NE NE 30-23n-1e, dry at 4,938 ft., Mississippi 4,493 ft., Viola 4,840 ft., Wilcox 4,892 ft., Marshall 4,921 ft.

Oklahoma County: Magnolia Petroleum Co. 1 Kratky-Sefcik Unit, NE NE 15-12n-4w, dry at 7,195 ft., Oswego 6,794 ft., Hunton 7,116 ft.

Pawnee County: Porter Oil & Gas Co. 1 Perry, NW NW NE 21-23n-4e, dry at 3,828 ft., Layton 2,375 ft., Oswego 2,950 ft., Misener 3,815 ft., Wilcox 3,820 ft.

Payne County: Midland Coop. Oil Co. 1 Lovell Brothers, SE SW NW 35-18n-3e, dry at 4,432 ft., Woodford 4,238 ft., Hunton 4,387 ft., Viola 4,326 ft., Wilcox 4,379 ft.

Pontotoc County: W. H. Pine 1 McCauley, NE NE SW 4-3n-4e, dry at 2,073 ft., Viola 1,375 ft.

M. A. Rainhart 1 fee, SW SW NW 36-3n-4e, dry at 1,998 ft., lost hole.

Tuesday Oil Co. 1 Pratt, NE NE 6-4n-4e, dry at 2,202 ft., Belle City 1,630 ft., Hogshooter 2,030 ft., Layton 2,102 ft.

Stephens County: Lundy & Shear 1 Johnson, SW SE SE 1-1s-9w, dry at 2,409 ft., sand 2,350-70 ft.

T. H. McCasland 1 Mosley, SW SE 20-1s-9w, dry at 3,360 ft., Canyon 3,332 ft.

Vickers Petroleum Co. 1 Walker-Voorhes, NE NE NE 2-2n-4w, dry at 11,009 ft., Pontotoc 2,990 ft., Hoxbar 5,006 ft., Tonkawa 6,855 ft., Checkerboard 7,798 ft.

Tillman County: T. P. Langford-Joe Staley at 1,764 ft., Granite Wash 1,650 ft. 1 Young, NE NE NE 26-1n-19w, dry granite 1,745 ft.

N. CENTRAL TEXAS

Shackelford Wildcats To Test Oil Shows

WICHITA FALLS.—In northern Shackelford County, two wildcats reported small production from the Ellenburger. Hickok & Reynolds 1 Merrick Davis, Section 14, Block 12, T&P Survey, reported recovery of 3 bbl. oil an hour while cleaning out after perforating in the Ellenburger at 4,949-57. The other test was Big West Drilling Co. 1 T. G. Hendrick Trust, in the AB&M Survey, which was said to be making from 12 to 15 bbl. of oil an hour from the Ellenburger at 5,253-63 ft. Tankage was being erected for production tests.

In Wichita County, just south of Wichita Falls, Continental Oil Co. 1 Shem Cunningham, topped Strawn limestone at 4,865 ft. and was drilling the formation below 4,895 ft. In Foard County, Magnolia Petroleum Co. 1 A. G. Bell, northeast of Foard City, was drilling hard limestone below 4,755 ft. Panhandle Refining Co.'s 1 J. Zotz,

in the Clark-Plumb subdivision southeast of Scotland in Archer County, had total depth at 5,379 ft. but plugged back and set casing at 4,058 ft. to test shows of oil in sands above that depth.

The second Ellenburger producer in the Fargo field of northwestern Wilbarger County to be completed was Humble Oil & Refining Co. 7 McCaleb, in Section 34, Block 15, H&TC Survey. The well flowed better than 200 bbl. of 41.9°-gravity oil in 6 hours through ¾-in. choke. Top of Ellenburger was 6,211 ft., with total depth at 6,297 ft.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCATS

Archer County: J. C. Man, Jr. 1 D. M. and C. S. Harris, Blk. 75, J. W. Harris Subd., 8 mi. SW Archer City, pumped 10 bbl. of oil a day, oil sand 1,344-46 ft., TD.

Young County: Cato Oil Co. 1 G. B. Hamilton, Sec. 1,393, TE&L Sur., 9 mi. NE Olney, flowed 109 bbl. oil a day through 12/64-in. choke, tubing pressure 100 lb., Caddo limestone 4,550-90 ft., TD 4,600 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: L. Raymond Dawson 1-A Mrs. L. Kinder, Blk. 5, C&P Sur., 4 mi. E Archer City, dry, TD 1,281 ft. in shale, Gunsight 1,186 ft.

Republic Natural Gas Co. 1 Ethel Lemmon, Blk. 3, Wm. Ainsworth Sur. A-1, dry, TD 1,355 ft., no shows.

P. B. Scott 1 J. A. Campbell, Allison Arms Sur. A-5, 10 mi. SW Archer City, dry, TD 1,260 ft., Gunsight 1,216-17 ft., slight show oil 1,221-26 ft.

White & Duncan 2 E. W. Maxwell, Sec. 2, J. Scott Sur. A-859, 1½ mi. E Archer City, dry, TD 1,265 ft. in broken sand and shale, show oil 1,181 ft.

Clay County: G. W. Cooper 3 Viola Myers, C. Thompson Sur. A-444, 3 mi. S Bluegrove, dry, TD 6,076 ft., Caddo 5,554 ft., show oil 5,744-59 ft., elevation 1,018 ft.

Cooke County: Benson Bros. 1 J. H. Cooke, A. Patterson Sur. A-817, 8 mi. NW Muenster, dry, TD 1,616 ft.

Grayson County: Burk Royalty Co. 1 H. G. Neathery, Chas. Quillen Sur. A-989, 1½ mi. S Collinsville, dry, TD 3,946 ft. in sand, show oil in sand 2,839-47 ft.

Montague County: Ray & Wolf 1 W. S. Barcus, Blk. 19, Kaufman School Land Sur., 7 mi. N Bonita, dry, TD 4,454 ft. in broken shale and sand, sand with odor 4,194-4,220 ft.

Young County: Goble & Moore 1 Mary Logan, J. W. Duty Sur. A-1,831, 8 mi. NE Graham, dry, TD 5,101 ft., Mississippi 4,950 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Shackelford County: E. E. Fogelson 1 H. A. Loner, Sec. 64, Blk. 11, T&P Sur., pumped 132 bbl. 44°-gravity oil a day, Strawn sand 3,061-78 ft., TD 4,346 ft., PB 3,078 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Comanche County: Thomas A. Jirik 1 Wade Freeman, Blk. 1 H&TC Sur., 6 mi. SW DeLeon, dry, TD 1,172 ft. in sand and shale.

Brown County: F. R. Jackson 2 L. A. Bell, Blk. 69, Brown School Lands, 6 mi. NE Brownwood, dry, TD 2,005 ft., Marble Falls 1,720 ft., show oil 1,732 ft., Ellenburger 1,908 ft., packer set 1,725 ft., acidized, tested 200 bbl. water and ½ bbl. oil in 12 hours.

Jones County: Owenwood Pool 3, 1 Herbert Koch, Sec. 28, HT&B Sur., 2 mi. N Lueders, dry, TD 2,079 ft., Gotham 1,330 ft., shale and coal 1,685 ft., water sand 2,061 ft.

Stephens County: Humble Oil & Refining Co. 1 W. H. Green "D," Sec. 2, A. J. Roe Sur., 17 mi. NE Albany, dry, TD 4,708 ft., Caddo 3,587 ft., Mississippi 4,265 ft., Ellenburger 4,603 ft., elevation 1,292 ft.

Taylor County: Senate Oil Co. et al 1 J. W. Seymore and Lincoln National Life Ins., Sec. 4, Burr & Caswell Sur., 6 mi. S Merkel, dry, TD 3,407 ft., coal 2,769 ft., Flippen 2,780 ft.

MICHIGAN

Big Wells in Garfield Pool, Newaygo County

SAGINAW. — Heaviest producers yet in the growing new Garfield field in Newaygo County were reported last week as state operations resulted in 19 completions. Twenty-one new locations were announced.

Scott Drilling Co. estimated initial potential at 2,000 bbl. a day from one of the Claybanks wells, while another by Sun Oil Co. was rated at 1,000 bbl. With two other good wells, that field accounted for 4 of the 10 producing wells on the completion list. Smaller wells were scattered over the state in Van Buren, Bay, Kent, Arenac and Allegan counties, in addition to another 300-bbl. well in the new Claybanks field of Oceana County.

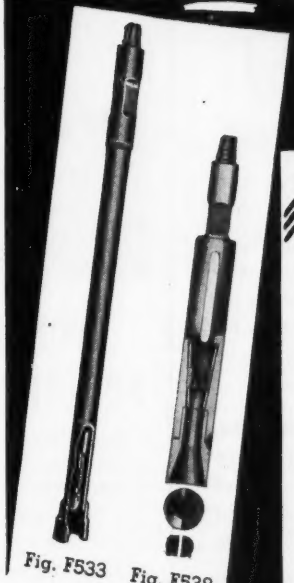
Five of the seven dry holes were wildcats and the two other completions were small gas wells.

MICHIGAN WILDCAT FAILURES

Allegan County, Dorr Township: Michigan Devonian Petroleum Co. 1 A. and C. Troike, SW SE NW 33-4n-12w, dry in Traverse limestone, TD. 1,610 ft.

Clare County, Lincoln Township: E. G. Thompson 1 Carnes et al, C N½ 9-18n-5w, dry hole, TD 1,655 ft.

Gratiot County, Newark Township: J. O.



SPANG TUBING SPEAR
(Fig. F533)

SPANG TRAP SOCKET
(Fig. F538)

FOR FISHING TUBING Spang offers a variety of tools, including Combination-Type Tubing Socket, Slip-Type Tubing Socket with mandrel, Cherry Picker, Spang Alligator-Style Grab, Tubing Spears in a variety of types, and the Spang Trap Slip Socket (Ill.) which has a unique slip arrangement enabling it to catch tubing or slivers in almost any condition.

For the best in Cable Tools,
SPECIFY SPANG

THE HIGHER STANDARD

SPANG & CO.
BUTLER, PA.

YOUR DEALER SELLS SPANG TOOLS

Florite* DESICCANT

The high-pressure dehydration unit here illustrated is a property of the United Gas Pipe Line Company at Carthage, Texas. It represents the most advanced design, construction, and operating technique; and the drying agent employed is FLORITE DESICCANT. The Stone & Webster Engineering Corporation, who designed and constructed the plant, are users of FLORITE in various types of equipment, large and small, for oil and gas companies and for other branches of industry.

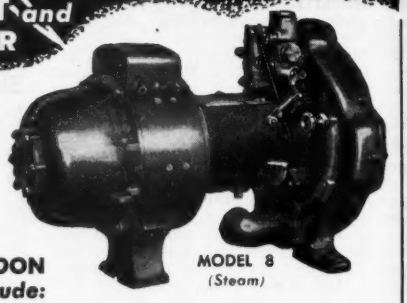
Natural gas, propane, butane, gasoline, air, nitrogen, carbon dioxide, refrigeration compounds, all are treated with superior drying efficiency by use of FLORITE. Selectively adsorbs 4 to 20% its weight of water—is regenerated by heating to 350°F. Write for literature, names of important users in your own field.

* Trademark Registered

FLORIDIN COMPANY
ADSORBENTS

Department C, 220 Liberty St Warren, Pa.

MOON Generators
TURBO and BELT DRIVEN
for LIGHT and POWER



HERE'S your ideal small power plant for lights, ventilating fans, or other electrical equipment.

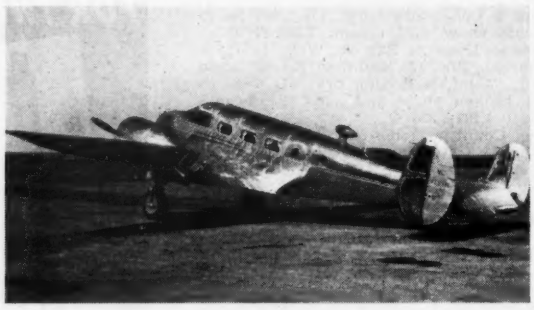
Important MOON features include:

- **GOVERNOR AND COMPOUND WINDING** on Steam-driven models prevent excess voltage output which might injure electrical apparatus . .
- **ONLY 2 EASY-TO-REACH OILING POINTS** . .
- **AUTOMATIC CUT-OFF** on larger capacity Steam-driven models prevents overload damage to generator . . . . . .

MODELS FROM 1 TO 7½ KW CAPACITY . . . SEND FOR ILLUSTRATED CIRCULARS TODAY

[Send in your old MOON Generators for re-building now — we can give prompt service.]

Moon MANUFACTURING CO.
ESTABLISHED 1893
116 NORTH JEFFERSON ST., CHICAGO 6, ILLINOIS, U.S.A.



TWIN ENGINE BEECHCRAFT FOR THE BUSY OIL EXECUTIVE

Licensed for 7. 3 Hardman reclining seats and couch or 5 Hardman seats. 485 hours since new on airplane and engines. ADF, VHF, 6210 and 3105. "Automatic Pilot that Works"—Deluxe interior with 2½ inches spun glass sound-proofing. Extra zero time engines and props if desired.

We have 2 licensed single engine Beeches and 2 unlicensed twin engine jobs also.

Write, wire or telephone No. 6016.

TIM FLYING SERVICE
622 WAGGONER BUILDING
WICHITA FALLS, TEXAS

Mutch 1 A. Simcox-W. Lombard, C N½ NW 14-10n-3w, dry in Marshall, TD 974 ft.

Missaukee County, Forest Township: L. R. Reese 1 Blair F. Scott, SE SE NW 32-23n-7w, dry hole, TD 1,510 ft.

Van Buren County, Bloomingdale Township: J. H. Fitchett 1 Claude C. Cook, SE SE SW 27-1s-14w, dry in Traverse limestone, TD 1,305 ft.

SOUTHWEST TEXAS

Shallow Gas Discovery In Zapata County

CORPUS CHRISTI.—A new gas pool for Zapata County has been opened by J. O. Moss et al 3 Amelia O. de Vela et al, in Block 28, Share 3, of El Grullo Grant, 1 mile north of Charco Redondo field. Drilled to a total depth of 1,155 ft., this well flowed gas through perforations at 574-580 ft. Now shut in with pressure of 240 psi.

A new oil pay for South Haldeman pool, Sunray Oil Co. 1-C C. T. Hewitt, in Section 51, R. P. Haldeman Subd. of Seeligson Ranch, flowed a potential of 216 bbl. of oil per day through an 11/64-in. choke, with gas-oil ratio of 912:1. Tubing pressure 840 psi., with casing pressure 1,200 psi. Gravity is 45.7°. Total depth is 6,006 ft., with production through perforations at 5,150-55 ft.

In Duval County, Santa Clara Oil Co. and John F. Camp & Sons 1-C James F. Welder Heirs, discovery well 3 miles south of west end of the Strake field, on official potential test, flowed 104.88 bbl. of oil daily through a 10/64-in. choke, gas-oil ratio 180:1; tubing pressure 230 psi., casing pressure 400 psi., gravity 24.8°, with no water. Total depth is 3,277 ft., with production from Government Wells sand topped at 3,274 ft.

William Herbert Hunt, Trust Estate, 1 Spencer-Crane, prospective discovery well 4½ miles north of Rockport in Aransas County, in C. O. D. Gilliland Survey, recovered 3,000 ft. of 43°-gravity oil on drill-stem test at 7,131-41 ft., using ¼-in. chokes.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Jim Wells County: New oil pay South Haldeman pool—Sunray Oil Co. 1-C C. T. Hewitt, in Sec. 51, R. P. Haldeman Subd. of Seeligson Ranch, top pay 5,135 ft., TD 6,006 ft., perf. 5,150-55 ft., IP: 216 bbl. oil per day through 11/64-in. choke, gas-oil ratio 912, TP 840 lb., CP 1,200 lb., gravity 45.7°, no water.

Zapata County: New gas pool—J. O. Moss et al 3 Amelia O. de Vela et al, in Blk. 28, Share 3, of El Grullo Grant, 1 mi. N of Charco Redondo field, TD 1,155 ft., perf. 574-80 ft., IP: gas well, shut in, shut-in pressure 240 lb.

SOUTHWEST TEXAS WILDCAT FAILURES

Bastrop County: General Crude Oil Co. 1 Haywood, in Chas. Smith Sur., 8 mi. SW of Bastrop, dry, TD 3,366 ft.

Bell County: Richardson, Douglas & Hudspeth 1 John W. Douglas, in G. W. Farris Sur., 3½ mi. S of Killeen, dry, TD 1,521 ft.

Duval County: Humble 1 M. M. Garcia et al, BS&F Sur. 539, 8½ mi. NE of Benavides, dry, TD 7,005 ft..

LaSalle County: Skinner & Eddy Corp. & Newman Bros. 2-C South Texas Syndicate, H&GN Sur. 75, 20 mi. S-SW of Fowlerton, dry, TD 5,498 ft.

Travis County: E. R. Marts 2 Van Harris, in Wm. Hines Sur., dry, TD 1,966 ft.

Webb County: Texas Co. 1 Teodoro Vasquez, T. Vasquez Sur., 8 mi. S of Bruni, dry, TD 3,175 ft.

J. W. Sewell 1 E. P. Wilmot Est., Sec. 201, O. P. Swenson Sur., 15 mi. N-NW of Bruni, dry, TD 2,375 ft.

Williamson County: B. P. Cavnar 1 D. G. Riethmeyer, in Hamilton White Sur., 3 mi. SE of Thrall, dry, TD 1,546 ft.

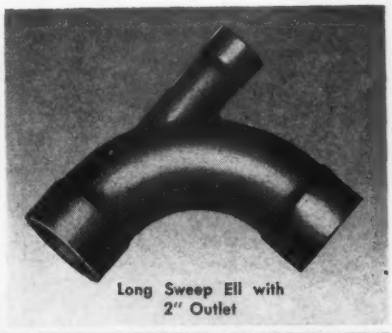
CANADIAN FIELDS

New Field Possible 25 Miles SE of Leduc

CHATHAM. — In the Wetaskiwin area, about 50 miles southeast of Edmonton, and south and east of the Leduc field, McColl-Frontenac 3-22, LSD 3, 22-46-23w4, has encountered oil showings, and is coring and testing around 4,369 ft. The showings are considerably higher than in the Leduc field, where Imperial-Leduc 1 got its production in the upper Devonian at 5,066 ft.

Leduc.—In the Leduc field, Imperial-Leduc 4, LSD 16, 15-50-26w4, finished at 5,361 ft., started with 1,200 bbl. potential after swabbing in at 2,450 ft. It ma bbl. an hour for 3 hours, but was later beaned down to ½-in. choke, with restricted production 160 bbl. Imperial-Leduc 1, discovery well with 3/16-in., is giving 176 bbl. No. 2, with 5/32-in., 190 bbl., and No. 3 with 5/32-in. making 157 bbl. The upper Devonian, in which No. 1 got its production, was unproductive in the other three wells, all of which are producing from a lower zone.

Gaspe. — A noncommercial oil showing has been encountered in C.P.L. 1, drilled by Gaspe Oil Ventures in the Gaspe Pen-



When pressures get high . . . USE THESE TOUGH FITTINGS!

Results prove that "'American" Standpipe and Manifold Fittings are made to meet the needs of present day drilling. They are built to really "take" extreme pump pressures . . . and at the same time reduce frictional losses on manifold and lines. Manufactured from the best grade of alloy steel castings, these fittings are precision machined and tested to 6,000 pounds hydrostatic pressure.

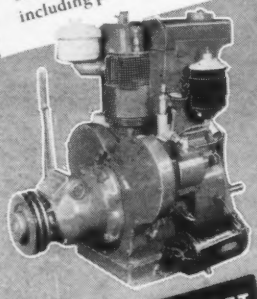
A AMERICAN
IRON & MACHINE WORKS CO.
OKLAHOMA CITY, OKLAHOMA
Office, Houston, Texas
Export Office: 420 Lexington Ave., New York City, N.Y.

Remember, there is an AMERICAN service man in every active field!!

Sheppard
AIR COOLED
Diesel Power
for small
but
important jobs

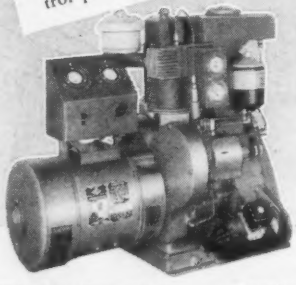
3½ H.P. POWER UNIT

Ideal for driving pumps, compressors or other equipment requiring dependable, low-cost power. Full diesel design . . easy to service . . . requires very little maintenance. Delivered complete, including power take-off and clutch.



2 K.W. GENERATING SET

Power lighting and communications systems for about 1¢ per K.W. hour. Excellent for standby service . . eliminates storage of gasoline. Electric or hand starting. A.C. or D.C. generators of varying voltages. Generator control panel included.



Write for illustrated literature. Specification sheet for power unit or generating set available on request.

R. H. SHEPPARD CO., INC.
22 Middle Street, Hanover, Pa.

Power Units—3½ to 56 H.P.

Sheppard DIESEL
DIESEL'S THE POWER . . .
Sheppard's the Diesel

Generating Sets—2 to 36 K.W.

insula of Quebec. Showing was met at 2,424 ft. and drilling continued carefully for 10 ft. in 2½-ft. stages, bailing after each operation. Samples indicated slight fracturing or fissuring, but showed no porosity or oil saturation; and it was concluded that the 42°-gravity oil had migrated upward through fissures from a lower formation. Drilling is being continued.

EASTERN TEXAS

New Oil Pay Zone In Grapeland Distillate Field

DALLAS.—A new pay zone, adding 30-gravity crude oil to the production at the Grapeland gas-distillate field in northern Houston County, was reported at Lone Star Producing Co. 1 Dora Ritchey. The well was said to have flowed 119 bbl. of oil a day through ¼-in. choke, from 10-ft. section of sand topped at 5,885 ft., and thought to be the subClarksville. Regular pay for the area is the Woodbine, around 6,000 ft. Location of the well is on the northwest edge of the field.

New Pettit production for Harrison County, 8 miles northeast of Marshall, was indicated at Stanolind Oil & Gas Co. 1 J. E White. A test of the Pettit at 6,353-6,474 ft., open 15 minutes, had gas in 2 minutes with maximum surface pressure of 325 lb., and recovered 170 ft. of gas-cut mud. There was a drilling break at 6,494-99 ft. but operators continued to 6,507 ft., then tested at 6,494-6,507 ft. Open 30 minutes, gas came to the surface in 15 minutes, at a maximum pressure of 140 lb., but recovery was only 10 ft. of gas-cut mud. Operators were last reported drilling below 6,507 ft. in sand and shale.

EAST TEXAS SUCCESSFUL WILDCAT

Anderson County: Elkhart gas area, Bluebird Investment Co. 1 A. E. Sutton and A. L. Jackson flowed 21,500,000 cu. ft. gas in 24 hours, open flow, plus approximately 3 bbl. distillate, RP 2,140 lb. on ⅜-in. choke, tubing pressure 1,390 lb., gas sand 5,496-5,508 ft.

EAST TEXAS WILDCAT FAILURE

Houston County: Magnolia Petroleum Co. 1 J. W. Grounds, J. C. Luce Sur., 6 mi. SE Grapeland, dry, TD 10,436 ft., sample tops: Navarro 4,605 ft., Austin 5,805-6,132 ft., Woodbine 6,175 ft., Glen Rose 8,232 ft., Massive anhydrite 10,000-110 ft.

SOUTH LOUISIANA

Gas-Condensate Found In Napoleonville Dome

NEW ORLEANS. — Gas-condensate production has been opened on the South Flank of Napoleonville Dome, Assumption Parish, by Crosby Drilling Corp. 1 Clifton Land Corp. et al, 45-12s-13e. This test was drilled to a total depth of 5,456 ft., with top of sand encountered at 5,368 ft. On initial production gage flowed 5 bbl. of condensate through a 16/64-in. choke with gas-condensate ratio 33,200:1. Also flowed 2,500,000 cu. ft. of gas per day, tubing pressure 2,150 psi., casing pressure 2,600 psi. Gravity is 46.2°. Production is through perforations at 5,368-72 ft.

A new oil discovery in the Moss Lake area of Calcasieu Parish, Sun Oil Co. 1 Louisiana Farm & Livestock, 2 miles west of East Moss Lake gas production, is installing surface equipment for a flow test. Total depth is 10,152 ft., plugged back to 9,138 ft. Completion is through perforations at 8,970-78 ft. where it cleaned through a ⅛-in. choke with 950 psi. flowing pressure on the tubing and 1,100 psi. on the casing.

Stanolind Oil & Gas Co. 1 E. M. Wat-

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that sealed bids will be received until 1 p.m., Eastern Daylight Saving Time, Wednesday, July 16, 1947 for lands described herein situated within the known geologic structure of the Hugoton gas field, 6th P. M., Kansas, and C. M., Oklahoma. These lands are offered to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act of February 25, 1920 (41 Stat., 437, 30 U.S.C., sec. 181), as amended, in the following parcels: Holcomb area, Hugoton field, Kansas: Parcel No. 1, T. 24 S., R. 33 W., sec. 18, lot 4, 35.72 acres, Parcel No. 2, T. 26 S., R. 33 W., sec. 5, lots 2, 3, 201.33 acres. Parcel No. 3, T. 27 S., R. 33 W., sec. 8, S½, 320 acres. Parcel No. 4, T. 27 S., R. 34 W., sec. 12, S½, 320 acres. Hugoton field, Kansas: Parcel No. 5, T. 31 S., R. 34 W., sec. 21, NE¼NW¼, 40 acres. Parcel No. 6, T. 32 S., R. 33 W., sec. 19, lot 3, 37.53 acres. Hugoton gas field, Oklahoma: Parcel No. 7, T. 2 N., R. 18 E., sec. 4, SW¼SE¼, 40 acres. Parcel No. 8, T. 2 N., R. 18 E., sec. 18, lot 1, NE¼NW¼, 80.11 acres. Parcel No. 9, T. 3 N., R. 18 E., sec. 31, SE¼SE¼, 40 acres. Parcel No. 10, T. 1 S., R. 12 E., fractional secs. 1 to 6 inclusive, 339.01 acres. Parcel No. 11, T. 1 S., R. 13 E., fractional secs. 1 to 6 inclusive, 320.44 acres. Parcel No. 12, T. 1 S., R. 14 E., fractional secs. 1 to 6 inclusive, 301.87 acres. Parcel No. 13, T. 1 S., R. 15 E., fractional secs. 1 to 6 inclusive, 294.11 acres. Parcel No. 14, T. 1 S., R. 16 E., fractional secs. 1 to 6 inclusive, 250.15 acres. Parcel No. 15, T. 1 S., R. 17 E., fractional secs. 1 to 6 inclusive, 191.38 acres. Total 2811.65 acres. Annual rental will be at the rate of 25 cents per acre so long as the land is valuable only for gas; but upon discovery of a valuable deposit of oil within the boundaries of the known structure on which all or a part of these lands are situated, rental will be not less than $1.00 per acre. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Bids must be submitted on each parcel separately, but no objection will be made to the award of more than one parcel to the same successful bidder. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., and each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank, or by money order, made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease, required under 43 CFR 192.42(b) and (c). The envelopes should be plainly marked "Bid for Parcel No. . . . , Hugoton gas field, Kansas and Oklahoma. Not to be opened before 1 p.m., Eastern Daylight Saving Time, Wednesday, July 16, 1947." No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental at the rate of 25 cents per acre must be paid, and a corporate surety bond in the sum of at least double the amount of rental but in no case less than $1,000 nor more than $5,000 must be furnished by a successful bidder prior to the issuance of a lease. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. The lands in Parcels Nos. 10 to 15 inclusive are subject to the act of August 7, 1946 (Public Law 617, 79th Congress), and any person believing or claiming to have a preference right under section 20 of the mineral leasing act as amended (43 CFR 192.70) for any of these lands must file his application for preference right lease with the Director, Bureau of Land Management, Washington 25, D. C., on or prior to the date herein set for the opening of bids. No particular form of application is required, but it should follow the instructions set out in 43 CFR 192.42, and reference should be made to this notice of offer for lease. The application must be accompanied by a filing fee of $10, together with one-half of the first year's rental at the rate of 25 cents per acre or fraction thereof. No preference right claim will be considered unless filed in accordance herewith. Fred W. Johnson, Director.

kins, 23-13s-1w, wildcat in west central Vermilion Parish, 6 miles east of Florence townsite, is preparing to make a flow test. An initial test through the drill-stem with perforations at 11,310-326 ft., using ⅛ and ¼-in. chokes and 10,500 ft. of water cushion, developed 4,300 psi. Operators did not let the well flow. Tester was pulled and mud was conditioned, which showed traces of gas and condensate. Total depth is 12,191 ft., with plugged back total depth at 11,970 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Assumption Parish: Discovery Napoleonville South Flank, gas-condensate—Crosby Drlg. Corp. 1 Clifton Land Corp. et al, 45-12s-13e, on S flank of dome, top sand 5,368 ft., perf. 5,368-72 ft., IP: 5 bbl. condensate per day through 16/64-in. choke, gas-condensate ratio 33,200, and flowed 2,500,000 cu. ft. gas per day, TP 2,150 lb., CP 2,600 lb., gravity 46.2°, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Jefferson Parish: The California Co. 6 Lester Pailet et al, East Lake Salvador area, 1-16s-22e, dry, TD 10,500 ft.

St. Mary Parish: Humble 1 State-Atchafalaya Bay, Lease 734, in the bay, dry, TD 11,728 ft.

Vermilion Parish: Sohio Pet. Co. 1 Placide Trahan, in Lelleux area, 33-11s-1e, approx. 4½ mi. E of Gueydan field, dry, TD 11,900 ft.

MISSISSIPPI

Sandersville Prospect Getting Eutaw Discovery

JACKSON.—The fifth test to be drilled on the Sandersville Prospect, in northeastern Jones County, between the Heidelberg and Eucutta fields, was showing for a discovery in the Eutaw. Union Sulphur Co. 1 Earline Parker, 31-10n-10w, cored the top of the Eutaw at 5,366 ft., on a derrick floor elevation of 322 ft. Continued coring recovered glauconitic sandy shale with some streaks of tight, shaley sand, but no shows, to 5,438 ft. Between 5,438-40 ft. the recovery was a gray, sandy shale with pin points of black oil, and from 5,440-48 ft. there was fine, silty, glauconitic sand with thin shaley partings, saturated with black oil.

At total depth of 5,448 ft., drill-stem test was taken with packer set at 5,442 ft. Open 18 minutes, and using ¼-in. choke at top and ⅜-in. on bottom, there was little pressure but recovery was 130 ft. of an estimated 16°-gravity oil, and 30 ft. of oil-cut mud. Bottom-hole flowing pressure was 1,035 psi. After the drill-stem test, operators cored from 5,448-53 ft., recovering 5 ft. of silty, saturated sand, with less shaley content than the previous cores.

At total depth of 5,048 ft., operators ran electric log to 5,046 ft., which indicated a fault of approximately 500 ft. at top of the Midway, at 4,097 ft.

MISSISSIPPI WILDCAT FAILURES

Tishomingo County: Tishomingo Development Co. 1 J. M. Russell, SW NW SE 3-4s-10e, dry, TD 1,513 ft., Tuscaloosa 103 ft., Mississippi 340 ft., Devonian 709 ft., Silurian 820 ft., Ordovician 1,150 ft., elevation 560 ft.

Warren County: Amerada Petroleum Corp. 1 Dabney-Bonelli, SW SW 9-18n-2e, dry, TD 5,207 ft.1 in salt, Wilcox 2,614 ft., Midway 3,700 ft., Tuscaloosa 4,090 ft., Massive sand 4,121-98 ft., Comanche 4,198 ft., salt 4,505 ft.

Washington County: C. H. Murphy, Jr. and Sun Oil Co. 1 Currey, NE NW SE 2-15n-8w, dry, TD 3,790 ft., no tops reported.

FLORIDA WILDCAT FAILURE

Baker County: Hunt Oil Co. 1 A. L. Hunt, NW NE 21-1n-20e, dry, TD 3,348 ft. in quartzitic sand topped at 3,342 ft.

TEXAS GULF COAST

Amerada Has Gas Discovery In Victoria County

HOUSTON.—A new gas pool 5 miles west of Nursery in Victoria County has been opened by Amerada Petroleum Corp. 1 Eliz. Mueller, in the Eli Stapp League. Drilled to a total depth of 9,916 ft., this well gaged 1,634,280 cu. ft. of gas per day through a ⅜-in. choke, with working pressure 900 lb. Production is through perforations at 2,872-82 ft.

Kirby Petroleum Co. 1 Kirby Petroleum Co. fee, Tract 20, is a discovery well for a new gas field in the Cedar Bayou area of Chambers County. Total depth is 8,015 ft., with 5½-in. casing cemented to 6,498 ft. and perforated from 6,312-16 ft. for the completion. It is cleaning through a ⅛-in. choke, showing gas and condensate. This new discovery is in the C. Smith Survey, Abstract 22, approximately 1 mile southeast of abandoned production in the Cedar Bayou field.

Falcon-Seaboard & Dunwoody have opened a new flank pay sand on the northwest flank of the Saratoga dome in Hardin County. Their 1 Sam F. Bashara, J. B. Reeves Survey, drilled to a total depth of 7,380 ft., gaged 178.86 bbl. of oil daily through a 14/64-in. choke, with gas ratio of 644:1. Flowing pressure on tubing was 500 psi. and 1,300 psi. on the casing. Gravity is 32°.

In Lavaca County, 2 miles north of Hallettsville, Forest Oil Corp. 1 H. C. Obelgoner, wildcat in James Campbell Survey 2, recovered some 39.9°-gravity oil on a drill-stem test at 7,924-32 ft.

LaGloria Corp. and Skelly 2 Jamie Hynes, wildcat in John Malone Survey, approximately 3 miles north of Refugio, is drilling ahead at 7,000 ft. On drill-stem test at 6,021-26 ft., using ¼-in. choke, showed 750 psi. working pressure and recovered 10 ft. of condensate and 10 ft. of condensate-cut mud. Bottom-hole pressure flowing 2,725 psi.

W. P. Taylor Drilling Co. and Joe Hornberger 1 A. A. Egg, in Simons Survey 24, Mayo area of Jackson County, flowed at the rate of 100 to 125 bbl. of 32°-gravity oil per day through 10/64-in. choke, through perforations at 6,512-18 ft. Total depth is 6,865 ft., with 5½-in. casing set at 6,646 ft.

TEXAS GULF COAST SUCCESSFUL WILDCATS

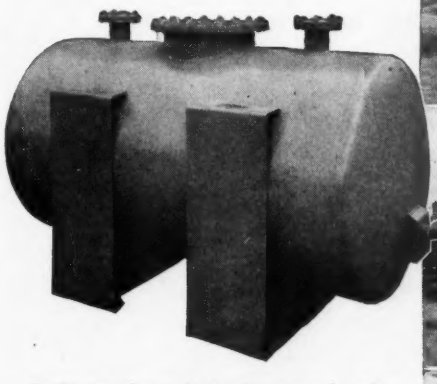
Hardin County: Oil discovery Saratoga Northwest Flank: Falcon-Seaboard & Dunwoody 1 Sam F. Bashara, J. B. Reeves Sur., TD 7,380 ft., top sand 7,310 ft., perf. 7,314-24 ft. and 7,328-38 ft., IP: 179 bbl. oil per day through 14/64-in. choke, gas-oil ratio 644, TP 500 lb., CP 1,300 lb., gravity 32.2°, no water.

Victoria County: New gas pool—Amerada Pet. Corp. 1 Eliz. Mueller, in Eli Stapp Lge., 5 mi. W of Nursery and 3 mi. SE of Mission Valley, TD 9,916 ft., perf. 2,872-82 ft., top pay 2,872 ft., IP: 1,634,280 cu. ft. gas per day through ⅜-in. choke, WP 900 lb.

TEXAS GULF COAST WILDCAT FAILURES

Calhoun County: Amerada Petr. Corp. 1-A

ONE MAN — ONE TRUCK —ANY NUMBER OF BODIES



In this installation, bodies happen to be rubber lined acid tanks. Built for any liquid or gas, in 500, 750, 1000 gal. capacities. It's the Dempster-Dumpster system of low cost materials handling - one truck hoisting unit handles any number of a dozen different types of bodies to suit your requirements, up to 10 cubic yards capacity. Write for catalog now.

DEMPSTER DUMPSTER
TRADE MARK REG.

DEMPSTER BROTHERS, INC. 347 Higgins, Knoxville 17, Tennessee

7046-A

Lavaca State, in State Tr. 9, Matagorda Bay, 1¼ mi. E of Pt. Lavaca, dry, TD 5,798 ft.

Fort Bend County: Woodley Pet. Co. and Sam F. Bashara 1 Sugarland Industries, North Sugarland dome, in W. M. Stafford Sur., dry, TD 5,381 ft.

Jackson County: Jos. Hornberger and J. B. Ferguson 1 Bessie Hudgins, in B. J. LaBauve Sur. 18, 1½ mi. NW of East Mauritz field and 2 mi. NE of Mayo field, dry, TD 7,100 ft.

Taylor Refg. Co. 1 W. W. Moore, I&GN Sur. 1, 3 mi. NW of Cordele field, dry, TD 4,552 ft.

Wharton County: Jack W. Frazier and O. J. and I. J. McCullough 1 Carl R. Traude, West Louise area, in John J. Dillard Sur., dry, TD 6,125 ft.

United North and South Development Co. 1 S. Hamburger, WC RR Sur., 3 mi. NW of Pierce townsite, dry, TD 5,950 ft.

LA.-ARK.

Union Parish Discovery Showing Salt Water

SHREVEPORT.—Completion tests on the Feazel, Neely & Roberts 1 Dykes, Nacatoch discovery in 24-22n-1w, Union Parish, and 7½ miles south of the abandoned Oakland field, was held up when salt water began seeping in. Operators believed it to be coming from the bottom of the pipe and were preparing to recement. Total depth is 2,202 ft., in the sand. Cores at 2,138-48 ft. recovered 5 ft. of oil sand.

In Bienville Parish, N. B. Hunt et al 1 Nebo Oil Co., 33-16n-7w, was drilling below 7,424 ft. in the lower Glen Rose. Union Producing Co. 1 Frazier, 8,000-ft. Travis Peak test in 14-14n-6w, was below 2,183 ft. in shale. C. W. Beene 1 Muslow, a shallow Nacatoch test in 13-21n-14w, Bossier Parish, had total depth at 1,105 ft. and was preparing to swab on shows of oil found in the sand. In Caddo Parish, C. H. Murphy, Jr. 1 W. C. Agurs, 7-16n-16w, was drilling below 4,721 ft. in the lower Glen Rose. A drill-stem test at 3,936-45 ft., open 40 minutes, had no pressure and recovered only 10 ft. of oil and gas-cut mud, plus 40 ft. of salt water. Skelly Oil Co. 1 Nash, DeSoto Parish test in 20-12n-16w, was drilling below 8,465 ft. in sand and shale, thought to be the Cotton Valley.

Arkansas wildcat reports included McAlester Fuel Co. 1-A McDonald, 23-17s-24w, Lafayette County, which was waiting on cement after moving in heavier rig. Total depth is 4,869 ft. in the lower Glen Rose. Six miles northeast of the Midway field, Hunt Oil Co. 1 Bodcaw Oil Co., 36-14s-23w, was drilling ahead below 3,000 ft. on a 6,000 ft. Smackover test. Location is in a faulted area in which three dry Smackover tests have previously been drilled.

NORTH LOUISIANA WILDCAT FAILURES

DeSoto Parish: Hewitt & Dougherty 1 Cook Land Co., NE SW 16-10n-11w, dry, TD 6,152 ft., base Austin 2,975 ft., Lower Cretaceous 3,010 ft., base Massive anhydrite 5,330 ft., James limestone 5,948 ft., elevation 311 ft.

Ouachita Parish: R. L. Fisher 1 Peola Cratz, SE NW 31-17n-4e, dry, TD 6,064 ft., Rodessa porosity 4,895 ft., 4,962 ft. and 5,049 ft., James limestone 5,220 ft., Pine Island 5,327 ft., Travis Peak 5,980 ft.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Richland Parish: C. H. Murphy, Jr. and Sun Oil Co. 1 Federal Land Bank, SE NE 10-17n-9e, flowed 1,000,000 cu. ft. of gas through 3/16-in. choke, tubing pressure 1,350 lb., gas sand 3,153-58 ft., TD 3,405 ft.

Altimeters
for all preliminary surveys
How much money will this instrument save YOU? Preliminary surveys in 1/10th the time with accuracy better than 1 part in 1000.
Type SA-1: Range 4360' (-760' to + 3,600') in intervals of 2'
Type SA-2: Range 10600' (-900' to + 9,700') in intervals of 5'
Type SA-5: Range 15000' (-500' to + 14,500') in intervals of 10'
All models priced $200 complete with case, hand & shoulder straps, magnifier and thermometer. IMMEDIATE DELIVERY —see your dealer or write direct for descriptive folder.
AMERICAN PAULIN SYSTEM
Manufacturers of Precision Instruments
1847 SOUTH FLOWER STREET, LOS ANGELES 15, CALIFORNIA
Altimeters

PERMIAN BASIN

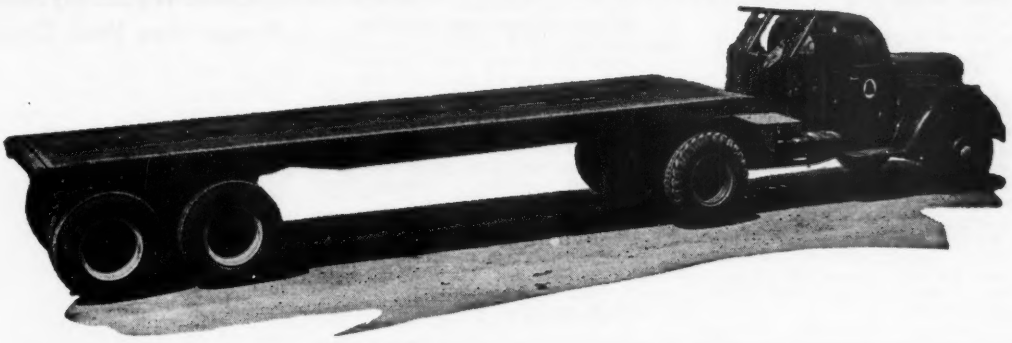
Ellenburger Production In Jameson Field

MIDLAND. — Possibility of Ellenburger production as the second pay zone at the Jameson (Strawn) field in northwestern Coke County was had last week in Sun Oil Co. 2 Allen Jameson when it recovered 35 ft. of free oil and 180 ft. of heavily oil-cut drilling mud on a 1-hour drill-stem test. Total depth is 7,110 ft., with top on the Ellenburger at 7,083 ft. Operators set casing at 7,068 ft. and will test the 42 ft. of open hole. Well is running about 18 ft. higher on the Ellenburger than 1 Fred Johnson, which had slight oil and gas shows in that zone but was plugged back for completion in the Strawn.

Extension of the Devonian pay in the Goldsmith field of Ector County was reported at Gulf Oil Corp. 430-E Goldsmith, Section 15, Block 44, T&P Survey. Location is ¾ mile northwest of the Devonian discovery in the field, and the 430-E is said to be running 26 ft. higher on the structure than the discovery well. Total depth was 7,993 ft., with op of the Devonian at 7,968 ft. A drill-stem test, with packer at 7,965 ft., brought gas to the surface in 20 minutes and recovered 330 ft. of oil and gas-cut mud, running about 60 per cent oil. Operators were drilling ahead below 8,018 ft.

In central Gaines County, Anderson-Prichard Oil Co. 1 P. W. Dalmont was drilling below 4,940 ft. in limestone, after two acid treatments failed to develop any shows. In Crockett County, Cities Service Oil Co. 1-B J. W. Owens continued testing the Wolfcamp zone after finding water in the Ellenburger. On last report it was flowing an average of 20 bbl. of oil an

HERE'S AN OIL FIELD TRAILER WITH *STAMINA!*



This serviceable American-built tandem platform trailer was developed by our engineering staff with the cooperation of hauling contractors and producers throughout the industry. It's sturdily-built to meet the most rugged hauling tests . . . designed and constructed from the standpoints of endurance, versatility and economical operation. The model S-F 42-T shown above is only one of a *complete line* of oil field platform and pole trailers—both single axle and tandem models in lengths to suit your needs. Prompt delivery assured. Write us TODAY for complete information—no obligation, of course.

AMERICAN BODY and TRAILER INC.

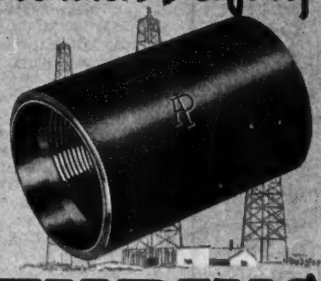
NORTH LITTLE, ROCK ARK. 3131 EAST BROADWAY

MAIN OFFICE - OKLAHOMA CITY 1500 EXCHANGE AVENUE

AMARILLO, TEXAS 740 NORTH GRAND

Coupled with Safety

WHEN YOU USE X-L QUALITY



OIL WELL TUBING COUPLINGS

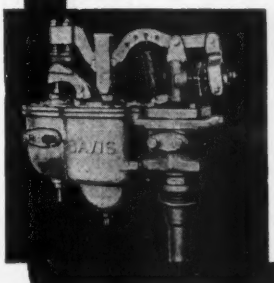
You can always be sure of tight, trouble-free joints when you specify "X-L" Quality Couplings. Available in Plain or External Upset for standard tubing. Made from steel. Tested by Comparator to assure strict adherence to A.P.I. standards.

When ordering, please use our catalog description; it will save time and error.

WHEELING MACHINE PRODUCTS COMPANY

WHEELING, WEST VIRGINIA

DAVIS SOLENOID VALVES *for—*



Steam, Air, Water, Oil Applications, Extreme Accuracy

Sizes ½" to 12" Pressures to 1500 Lbs.

Davis No. 97TH two-step Solenoid Valve for extremely accurate proportioning or throttling of liquid flow.

Davis Solenoid Valves are operated by any device that will make or break an electrical circuit, and are furnished either normally open or normally closed—explosion proof if desired.

Davis valves adapted to solenoid operation include: single seated valves for high or low pressure, balanced valves, butterfly valves, and 3- or 4-way pilot valves. Reciprocating or rotary steam type. For extreme accuracy, the Davis Two-Step Solenoid Valve is available.

Write today for details

DAVIS REGULATOR COMPANY

2543 SOUTH WASHTENAW AVE., CHICAGO 8, ILL.

Distributor: Westcott & Greis, Tulsa, Dallas and Houston

hour from perforations at 5,670-75 ft., through a 1-in. opening on tubing.

WEST TEXAS SUCCESSFUL WILDCAT

Mitchell County: 2½ mi. NW Westbrook field—Tobe Foster 1 R. S. Brennand, Sec. 4, Blk. 28, T&P Sur., pumped 55.44 bbl. oil in 24 hours, plus approximately 5 bbl. water, gravity 25.3°, sand 2,703-2,775 ft., TD 2,885 ft., PB 2,775 ft.

WEST TEXAS WILDCAT FAILURES

Hockley County: Amerada Petroleum Corp. 1 J. B. Shofner, Lodge 734, State Capital Lands, 2 mi. N Levelland, dry, TD 5,000 ft., anhydrite 2,210 ft., first limestone 3,600 ft., San Andres 3,920 ft., elevation 3,537 ft.

Howard County: Cosden Petroleum Corp. 1 Reed, Sec. 19, Blk. 30, T&P Sur., 3 mi. N Coahoma, dry, TD 4,175 ft., scattered oil stains and odor sulfur throughout, limestone 2,300 ft., Clear Fork 3,260 ft., elevation 2,460 ft.

Scurry County: Ohio Oil Co. 1-C J. W. Neal Estate, Sec. 1, R. M. Miller Sur. A-868, NE cor. of county, dry, TD 7,339 ft., Detrital 7,220 ft., Ellenburger 7,229 ft., elevation 2,164 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Barnsdall Oil Co. 1 Elliott-Federal, 1-mile north and west extension to Permian production on the northwest side of the Drinkard field in Lea County, 20-21s-37e, swabbed and flowed 110 bbl. of oil and 32 bbl. of water in 15 hours, from open hole at 6,670-97 ft. Source of the water had not been determined, but operators thought it might be coming from the plug at 6,697-6,709 ft.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURE

Lea County: The Texas Co. 1-AK State, SE SE 16-16s-38e, dry, TD 6,620 ft., anhydrite 2,095 ft., Yates 3,170 ft., Glorietta 6,315 ft., elevation 3,730 ft.

Quality Comfort Convenience In Your EXECUTIVE PLANE

- COMPLETE CONVERSION
- REFITTING - EQUIPPING
- SERVICE AND REPAIRS
- ENGINE CHK., OVERHAUL
- INSTRUMENT SERVICE

It is for those refinements in design and quality and workmanship so distinctively the hallmark of **Dallas Aero Service** that outstanding business institutions from all parts of the United States and from nations outside her borders send their Executive Aircraft to **Dallas Aero** to be convertea modified, refitted or re-equipped

CAA Certified Repair Station No. 169

Dallas Aero Service

A DIVISION OF HARRY M. CHASE INC.

Love Field • DALLAS, TEXAS • Ph: D 4-2641

ROCKY MOUNTAIN

Central Wyoming Has Prospective Pool Opener

DENVER.—A new oil pool in Albany County, south central Wyoming, appears in the offing in California Co.-Phillips Petroleum Co. 1 Christiana, NE NE SE 8-17n-77w, on the Seven Mile structure, on the west side of the Laramie Basin and east of Medicine Bow range foothills. It had top of the Muddy sand at 5,816 ft., ground elevation 8,004 ft., and in a drill-stem test at 5,821-33 ft., through ¼-in. choke, recovered 940 ft. of 33.5°-gravity crude and 50 ft. of oil-cut mud in 30 minutes. A core at 5,833-43 ft. resulted in the recovery of 9 ft. of hard dry sand and 1 ft. of saturated sand. Dakota formation was topped at 5,915 ft., and drillers are preparing to core.

Rangely to be drilled up.—Recent failure of operators in the Rangely field in western Colorado to reach an agreement for the unitization of the field has resulted in a renewal of progressive drilling of offset locations. As a result it is probable that the entire field will be drilled up before there is any slowing down of the activity. Nineteen new locations were reported this week, of which 9 were by Stanolind, 7 by California Co., 2 by Texas Co., and 1 by Idaho - Sharples - Wasatch group. Forty-seven rotaries were running before these locations were released. Most of the new locations are offset wells on the fringe of the developed area. However, there are a number of inside blank spots on the map where one well to 80 acres was drilled. The geological structure, as mapped by the U. S. Geological Survey, contains 29,537 acres within the designated boundaries, or approximately 738 locations. So far 240 wells have been completed, including several dry holes, indicating that the field is about 40 per cent drilled up in the Weber sand.

Mush Creek extension.—Morton Drilling Co. 1 Sedgwick, C NE NE 17-44s-63w, Mush Creek district, Weston County, Wyoming, topped the Muddy sand at 4,155 ft., where it encountered good saturation, and stopped drilling at 4,160 ft. to change over to cable tools. The location is 1½ miles west of the nearest producer, and that much farther out into the Powder River basin than any well so far completed in the field.

Mosser Dome oil well.—Amick Drilling Co. 1 Kelly, NE NE SW 26-3s-24e, Mosser Dome, Yellowstone County, southern Montana, was completed at 1,011 ft. in the Cloverly sand of lower Cretaceous age for 120 bbl. per day. It had the top of the Cloverly at 997 ft., and picked up the saturated sand at 1,007½ ft. It drilled 2½ ft. into the sand and swabbed 2½ bbl. per hour. It then was deepened 1 ft. and swabbed 5 bbl. per hour.

Oil show at Table Rock.—Texas Co. 3 Unit, NW SE 2-18n-98w, Table Rock structure, Sweetwater County, Wyoming, had a good show of oil at 2,668-88 ft. and is preparing to make a drill-stem test. It is a Tertiary test and located 1 mile southwest of 1 Unit, a gas discovery in 1946 at 3,831 ft., making 5,692,000 cu. ft. of gas per day in sand in the Laramie beds.

New operations.—Forty-two new operations were reported, an all-time high for a single week, of which 24 were in Colorado, 10 in Wyoming, 6 in Montana, and 2 in Utah. Eighteen of the 24 in Colorado were in the Rangely field. The others were one each in Piceance Creek, Hygiene, Debeque, Elk Springs, Harvey Gap and Rattlesnake Butte. Three are wildcats.

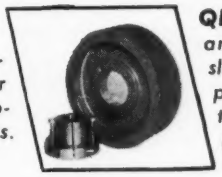
Wyoming locations included three in Hamilton dome, and one each in Salt Creek, South Spring Creek and Mush Creek and four wildcats.

Montana locations were three in Cut Bank, and one each in Kevin-Sunburst, Cedar Creek and Cat Creek. In Utah,

SPECIFY
TRANSCO V-DRIVES

FOR FAST DELIVERY FROM STOCKS IN THE SOUTHWEST

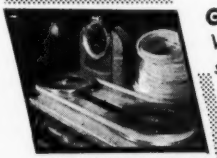
BOLTRIM SHEAVES—*The original demountable rim sheave, improved to better meet today's requirements. Quick shipment with either standard or special hubs.*



QD SHEAVES—*The original and most popular tapered sleeve type sheave for compression fit on the shaft. Easy to put on—easy to remove. Rims can be changed without dismounting hub.*

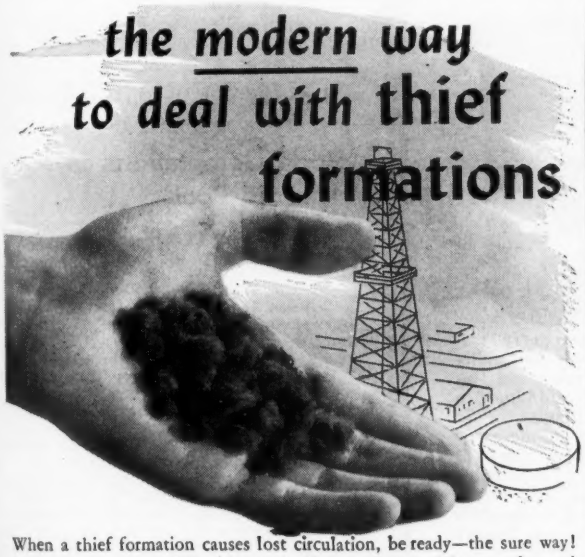
COMBINATION GROOVE SHEAVES—*Cartied in jobber stocks everywhere for use with either A or B V-belts, these lighter weight sheaves meet a large percentage of all V-drive needs and are available at lower cost because of high production.*

SPECIAL SHEAVES—*With our own foundry facilities, we can offer prompt service on any required special sheaves, up to 56" PD and any face width.*



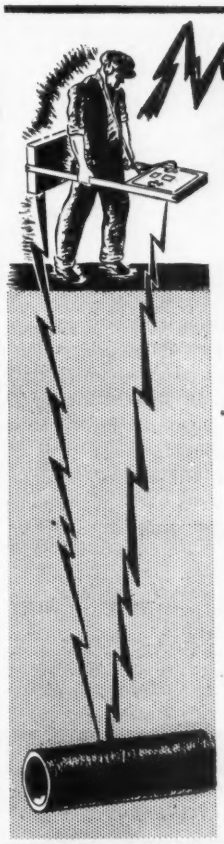
GOODRICH V-BELTS—*Goodrich V-Belts are carried in stock in all popular sizes plus some few of those which are less widely used. Goodrich quality plus well matched sets means better service from your drives.*

TRANSMISSION MACHINERY CORPORATION
DALLAS, TEXAS



When a thief formation causes lost circulation, be ready—the sure way! Operators are successfully using basic fibrous raw materials, manufactured by Wood Conversion Company, to bridge fissures and to seal off porous areas in the formation wall. These materials, widely known under the trade name K-25 Industrial Fiber (shipped in bales), can be mixed and held in reserve—ready for use whenever needed. The chemically treated fibers of clean, new, coniferous wood form a lasting mat, providing a dense seal—fibers stay suspended in the mud until deposited. K-25 Industrial Fiber is impervious to rot and decay—is excellent when used as a mud conditioner. For full information and samples write Wood Conversion Company, Dept. 204-67, First National Bank Bldg., St. Paul 1, Minnesota.

K-25 INDUSTRIAL FIBER



M-SCOPE
ELECTRONIC PIPE FINDER and LEAK LOCATOR

Used successfully for many years by oil and utility companies

- Locates exact position of a buried pipe or other metallic objects, and determines their depth.
- Traces the course of an underground line without contact with the line itself.
- Locates underground leaks and works positively and instantaneously under all conditions.

Send for free 16 page booklet

FISHER
RESEARCH LABORATORY, INC.
1961 University Avenue
PALO ALTO CALIFORNIA

Carter Oil Co. has made location for 1 Knudson. C SW NE 18-5s-21e, Vernal, Uintah County, 6 miles southeast of 1 Davis, which recently was abandoned at 8,001 ft. The other is California Co. 1 Unit, C SW NW, 12-36s-1e, Upper Valley structure, Garfield County, Utah, a 6,500-ft. test to the Pennsylvanian.

WYOMING WILDCAT FAILURE

Antelope Plain, Fremont County: General Petroleum 45-25-G Unit, NE NE SW 25-27n-94w, TD 10,776 ft. Water in Frontier, Lakota, and Nuggett. Top Frontier, 8,790; Dakota, 10,050; Lakota, 10,096; Curtis, 10,380; Entrada, 10,520; Nuggett, 10,630 ft., Ele. 6,942 RB.

MONTANA WILDCAT FAILURE

Rattlesnake Butte, Petroleum County: Dave Schrock 1 Clauson, NE SE NE 27-13n-28e, TD 2,708 ft., plugged and abd. in Ellis, first Cat Creek 2,400 ft.

ILLINOIS

Three Likely Prospects In 3 Illinois Counties

MATTOON.—Calvert & Willis et al 1 Crackel, NE NE SE 19-1s-14w, Edwards County, on drill-stem test at 2,706-22 ft., had gas in 28 minutes and recovered 2,542 ft. of fluid which was mostly oil. Pipe has been set to test. Production is from Cypress at 2,708-22 ft.

The same operators 1 Mason, SE SE SE 10-4s-7e, Hamilton County, swabbed 191 bbl. oil per day while cleaning out to test the Aux Vases at 3,257-67 ft. Total depth is 3,267 ft.

V. M. Scheef 1 Olive, NE NW NE 25-2s-1e, Jefferson County, on drill-stem test in Benoist at 2,030-36 ft., recovered gas, 527 ft. of clean oil, 63 ft. oil-cut mud, and no water. Total depth is 2,036 ft. Pipe has been set to test. The well is located about 1 mile from production in the Woodlawn pool.

ILLINOIS SUCCESSFUL WILDCATS

Clay County: National Associated Oil Co. 1 Spiker, SE SE SE 12-3n-5e, IP 20 bbl. from Aux Vases 2,779-2,802 ft., shot 20 qt. 2,792-2,800 ft., Lower Paint Creek 2,715 ft., TD 2,803 ft.

Edwards County: Fred Hildt 1 Endicott, NW SW NE 23-3s-10e, IP 38 bbl., from Benoist 2,991-3,010 ft., shot 30 qt. 2,998-3,010 ft., Renault 3,114 ft., Aux Vases 3,137 ft., TD 3,233 ft., PB 3,010 ft.

Lawrence County: S. Vanetie 1 Lindsay, SW NW SW 20-3n-10w, IP 2 bbl., Perf. Rosiclare 1,860-68 ft., and McClosky 1,881-84 ft., Aux Vases 1,809 ft., Ste. Genevieve 1,821 ft., TD 1,907 ft.

Richland County: British American et al 1 Higgins, NW NW NW 36-2n-14w, IP 223 bbl. from McClosky 2,901-03 ft., TD 2,903 ft., acidized 1,500 gal., Ste. Genevieve 2,866 ft.

ILLINOIS WILDCAT FAILURES

Clay County: J. J. Lynn 1 Stanford, NW NW SW 36-3n-7e, dry at 3,132 ft., Ste. Genevieve 3,071 ft., McClosky 3,086 ft.

Clinton County: Carter Oil Co. 1 Brink, SW NW NW 3-1n-2w, dry at 1,605 ft., Tar Springs 932 ft., Cypress 1,242 ft., Aux Vases 1,389 ft., Rosiclare 1,498 ft., McClosky 1,543 ft.

Franklin County: Will I. Lewis 1B Neuf, NE SE 29-5s-2e, dry at 2,730 ft.

Lawrence County: E. Zink 1 Fink, SE SE NW 32-4n-10w, dry at 3,738 ft., Ste. Genevieve 1,656 ft., McClosky 1,690 ft.

Jasper County: Collins Brothers 1 Mitchell, SW SE SW 34-7n-8e, dry 3,110 ft., Tar Springs 2,411 ft., Cypress 2,663 ft., Rosiclare 2,988 ft., McClosky 3,041 ft.

Montgomery County: C. A. Vander 1 Helstor, NE SE NW 15-8n-4w, dry at 602 ft., Pottsville 585 ft.

Perry County: Collins Brothers 1 Walden, SE NE NW 7-4s-1w, dry at 1,352 ft., drilled through Benoist.

MEN IN THE FIELD
Will Tell You—
JP Rods & Liners Give Results!
Machining + Hardness
JP
Operators responsible for getting a job done want and need tools and equipment that will stand the gaff. That's why they're recommending JP Rods and Liners — yes, they've discovered that rods and liners, machined and hardened hard, as JP's are, will cut down work stoppages and increase efficiency when "makin' hole" really counts.
Expert oil country machinists, using top-quality materials, grind and finish JP Rods and Liners to precision standards. In addition—each and every JP Rod and Liner is "hardened" by a patented process and individually inspected to approximately 600 (or better) Brinell test.
CALL — WRITE — WIRE — CABLE
Made to A. P. I. standards, JP Rods and Liners are available in all stock sizes (and special sizes) to fit any slush pump. For information on sizes and prices—ask for our New Catalog or give us your specifications.
JP
J P Machine & Tool Company
1534 S. E. 29
P. O. BOX 4511
TEL. 3-8700
OKLAHOMA CITY

OHIO, KENTUCKY

Good Completions in Pittsfield Pool

COLUMBUS.—Some of the best wells to be completed in the Ashland-Lorain field recently have been in the Pittsfield pool. The Ohio Fuel drilled in and tubed 1 William D. McConnell, Lot 103, with an open flow of 1,780,000 cu. ft. natural. Clinton sand was found at 2,206-14 ft. and extends the pool ½ mile to the east.

B. G. Bartley stepped over two dry holes and picked up Clinton gas production on the Lucile Aston Tract in Section 29, Blue Rock Township, Muskingum County, a 1½-mile south extension. Sand was reported at 4,296-4,344 ft. with 330,000 cu. ft. natural, and 660,000 cu. ft. when shut in after shot. Rock pressure is 1,225 psi.

Two good oil producers were completed in the Hemlock Grove pool, both in Bedford Township, Meigs County. On an inside location, the Preston Oil 4 G. E. Hauck, Section 2, flowed 31 bbl. and swabbed 7 bbl. in 24 hours after shot. Walker & Campbell 2 A. A. Nelson, Section 1, made 40 bbl. and 100,000 cu. ft. gas after shot.

A ⅝-mile extension to the Sayre pool in Bearfield Township, Perry County, was completed by the Ohio Fuel on J. A. Wells, Section 11. Clinton sand at 3,815-45 ft. made 798,000 cu. ft. natural with no showings of water. In the same township, F. R. Beasley 1 S. H. Pettit, Section 26, found the Clinton dry, but [illegible] 7 ft. in the Medina the well gaged 450,000 cu. ft. natural, and 600,000 cu. ft. 8 hours after shot.

OHIO WILDCAT FAILURES

Meigs County, Bedford Township: Ohio

Fuel Gas Co. 1 A. E. Cain, Sec. 36, shale, TD 3,067 ft.

Muskingum County, Newton Township: Ohio Fuel Gas Co. 1 C. W. Snyder, Sec. 23, Clinton 3,823-85 ft., Medina 3,932-40 ft., TD 3,957.

WESTERN KENTUCKY

OWENSBORO.—F. J. Fleming et al 1 B. Melton, 7-N-23, is rigging up rotary to drill deeper, after having tested Tar Springs at 1,931-58 ft. Total depth is 1,958 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: F. H. Rhodes 1 John Nation, 2-N-28, dry at 1,940 ft., Kincaid 947 ft., Viola 1,240 ft., Barlow 1,575 ft., Ste. Genevieve 1,815 ft.

Henderson County: C. Wood 1 W. A. Sauer, 16-Q-22, dry at 2,700 ft., Glen Dean 1,956 ft., Barlow 2,215 ft., McClosky 2,610 ft.

EASTERN KENTUCKY

ASHLAND.—The J. W. Maynard farm in Pike County came in for the top completion news of the week, during which several new locations were noted.

Kentucky-West Virginia Gas Co. completed Well No. 845 on the Maynard land, bringing it in at 2,200 ft., with a Big lime output of 2,100,000 cu. ft. of gas.

The same company completed Well No. 5709 on the W. J. Slone property, Knott County, at a depth of 3,316 ft., with an estimated daily production of 84,000 cu. ft. of gas in shale, after shot.

INDIANA

EVANSVILLE.—Ralph Halbert et al 1 Ayrshire Collieries, SW SE SW 30-2s-7w, Pike County, is making production test of McClosky lime at 1,403-09 ft. and flows 25 bbl. oil per hour, natural, while filling available tank space. The well is about 2 miles southeast of the Oakland pool.

INDIANA WILDCAT FAILURES

Gibson County: W. R. White et al 1 Martin, NW SW NW 17-4s-11w, dry at 2,267 ft., drilled through Cypress.

Knox County: P. T. Goldberg 1 Wharf, Lot 7, Mil Don 52, 3n-9w, dry at 1,588 ft., Barlow 1,406 ft., Cypress 1,422 ft., McClosky 1,560 ft.

CALIFORNIA

Santa Barbara Discovery Flows 312 Bbl. Per Day

LOS ANGELES.—Sunray Oil Corp. has either added an important extension to the Orcutt field or opened a new producing area approximately 1½ miles southeast of proven leases at Orcutt with the completion of its wildcat, the 1 Los Flores, 4-8n-33w, in Santa Barbara County. The well is bottomed at 5,998 ft. and is producing from a 25-ft. zone of saturated Miocene sand through perforations at 3,805-30 ft. On a 4-hour test at this depth, the 1 Los Flores flowed 536 bbl. of 33°-gravity clean oil through a ¼-in. choke. Latest production gages, however, show the well to be flowing at the rate of 312 bbl. of 35.4°-gravity crude daily through an 8/64-in. choke.

The well was drilled on a block of 5,000 acres comprising parts of the Los Flores and Careaga Ranches. Sunray has announced that the crude produced by the discovery will be marketed through the Santa Maria refinery. A 9-mile line is being laid connecting with the company's pipe line, which gathers approximately 4,000 bbl. daily of Sunray production in the Santa Maria field. This discovery is of great importance since it provides a source of high gravity oil in an area where heretofore only the heavier Santa Maria crude has been available.

Having successfully completed a fishing job, Standard Oil Co. of California is exploring on down below 8,250 ft. at the 1 Boobier, 15-4n-17w, in the Del Valle area of Ventura County. Meanwhile, in the same area, Russell Havenstrite is running liner in his wildcat, the 15 Lincoln, 16-4n-17w. The project has now reached a total depth of 11,865 ft., and a routine check of the hole and normal tests will now be made. A new deep zone, known to have been picked up at 10,140 ft., has not yet been tested.

General Petroleum Corp.'s new well in the Lakeview area of the Midway-Sunset field, the 4 Pacific, 32-12n-23w, has been completed flowing at the rate of 1,078 bbl. of 27.5°-gravity oil daily through a 24/64-in. choke. General Petroleum bottomed the 4 Pacific in about 200 ft. of brown shale formation at a total depth of 3,975 ft. After being swabbed briefly, the well started flowing and subsequently was completed. It is in an area of the field that has been practically void of drilling during the past 20 years and was developed by drilling somewhat deeper than the old Obispo sand from which most of the surrounding wells are producing. General Petroleum has staked location for the 15 Pacific one location west of the 4 Pacific, and it is probable that the area is headed for a new drilling campaign.

OREGON TESTS DRY

The Texas Co., after drilling wildcat failures in Columbia River country, Oregon, was dismantling drilling equipment for shipment to California.

CALIFORNIA WILDCAT FAILURES

Kern County, Blackwells Corner Area: Hamilton & Sherman B-2 Beer, 17-26s-19e, dry, elev. 700 ft., TD 1,054 ft.

McDonald Anticline Area: Honolulu Oil

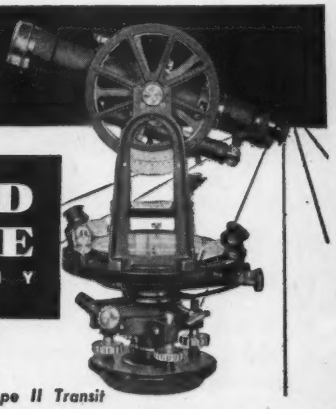
White TRANSITS · LEVELS · ALIDADES
WITH COATED OPTICS

...For greater Accuracy and all-around Dependability

The recognition accorded White instruments is world-wide — a tribute to the accuracy and dependability for which they have long been famous. Write today for detailed literature and price data.

DAVID WHITE COMPANY
307 W. COURT STREET
MILWAUKEE 12, WISC.

Manufacturers of instruments for engineers, surveyors and builders



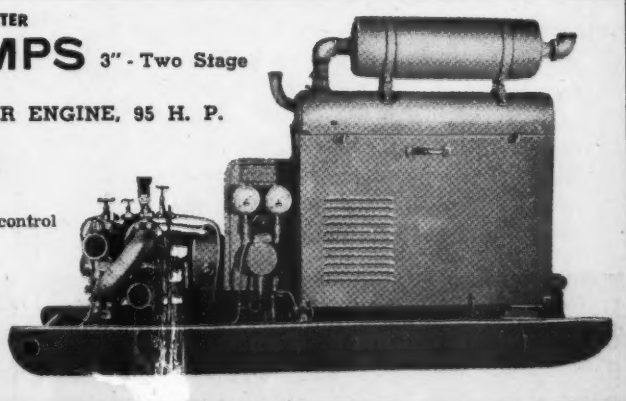
Illustrated, famous Type II Transit

FOR GASOLINE — CRUDE — WATER
BYRON JACKSON PUMPS 3" - Two Stage
CHRYSLER C-36 INDUSTRIAL 8 CYLINDER ENGINE, 95 H. P.
New—$955.00 each
Government Cost $2384.00

Complete with battery; muffler; Penn switch; Mercoid control Fire extinguisher; couplings for parallel operations.
SPARE PARTS AND TOOLS

IMMEDIATE DELIVERY

Priced subject to prior sale, change in price without notice, our confirmation. Net cash. Priced F. O. B. San Antonio, Texas. Other new surplus pumps. Send orders to H. H. Coffield, Attn: W. H. Orr, Box 466, Rockdale, Texas, Phone 132.



Corp. 3 Honolulu-Wilshire-Layman, 18-28s-20e, dry, elev. 992 ft., Miocene 558 ft., Button Bed 1,010 ft., Upper Santos 1,091 ft., Lower Santos 1,604 ft., Phacoides 1,815 ft., Kreyenhagen shale 1,850 ft., TD 1,960 ft.

Los Angeles County, Leffingwell Area: Standard Oil of Calif. 1 German Comm., 11-3s-11w, dry, elev. 183 ft., TD 10,304 ft.

Loma Verde Area: Shell Oil Co. 1 Union-Poindexter, 12-3s-14w, dry, elev. 194 ft., TD 5,000 ft.

ard of Calif. 2 Scally Estate, 15-4n-11w,

San Luis Obispo County, Nipomo Area: Union Oil Co. 2 Vernon Wineman, 7-11n-33w, dry, elev. 960 ft., TD 3,665 ft.

Solano County, Kirby Hills Area: Standdry, elev. 279 ft., TD 3,614 ft.

Tulare County, Ducor Area: Gene Reid Exploration Co. et al 1 Mayo, 13-23s-36e, dry, slate 3,276 ft., TD 3,450 ft.

Ventura County, Oxnard Area: Andrew Lucas 1 Pfeiler, 1-1n-22w, dry, elev. 30 ft., Basalt 4,933 ft., TD 4,937 ft.

SUMMARY OF MAY COMPLETIONS

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	152	82	194	0	[1]70	0	152	0	0	0	227,141	232
Pennsylvania	282	146	309	29	[2]107	0	0	282	0	0	456,942	294
West Virginia	59	11	295	41	7	4	32	20	3	0	162,141	254
Ohio	96	15	247	49	32	13	32	50	1	0	258,776	226
Indiana	41	21	1,079	0	20	6	33	2	0	0	69,988	68
Kentucky	61	21	1,224	11	29	18	27	16	0	0	107,987	73
Illinois	149	81	6,715	0	68	7	47	95	0	0	373,696	183
Michigan	83	25	5,448	3	[3]55	0	46	37	0	0	167,688	106
Kansas	211	111	52,752	27	[4]83	1	24	194	2	0	716,167	350
Neb., Iowa, Mo.	0	0	0	0	0	0	0	0	0	0	0	12
Oklahoma	335	195	21,849	26	114	13	126	150	42	4	1,031,343	540
Texas	817	542	100,029	47	228	33	157	326	287	14	3,751,146	1,098
North	172	112	12,375	2	58	13	83	53	23	0	555,046	244
West Central	78	34	3,904	6	38	3	18	50	7	0	257,557	67
West	203	168	58,584	6	29	13	33	93	62	2	940,227	189
Panhandle	37	26	2,202	7	4	0	1	36	0	0	114,582	143
Eastern	48	[5]26	4,095	[5]10	12	0	4	20	21	3	276,464	112
Gulf Coast	140	[6]91	10,293	8	41	2	4	32	96	6	863,976	168
Southwest	139	[7]85	8,576	8	46	2	14	42	78	3	743,294	153
Louisiana	134	89	14,540	11	34	5	38	37	33	21	713,676	211
Northern	77	[8]46	6,545	9	22	5	34	25	12	1	216,722	71
Southern	57	[7]43	7,995	2	12	0	4	12	21	20	496,954	140
Arkansas	38	[5]19	4,981	2	17	1	5	25	7	0	145,082	37
Mississippi	56	35	13,885	[7]6	15	0	0	2	22	32	510,530	103
Ala., Ga., Fla.	5	1	518	0	4	1	0	3	0	1	24,862	18
Montana	22	13	318	5	4	1	13	8	0	0	43,309	75
Wyoming	21	15	7,379	3	3	2	1	11	6	1	98,492	65
Colorado-Utah	16	10	3,315	1	5	1	1	1	13	0	93,848	77
New Mexico	45	35	22,322	5	5	0	2	24	19	0	216,722	84
California	189	155	28,767	3	31	7	45	69	58	10	822,022	335
Total May	2,822	1,622	286,166	269	931	113	781	1,352	493	83	9,991,558	4,455
Total April	2,223	1,247	220,771	185	791	107	614	1,064	385	53	7,809,000	3,797

Service wells included: [1]70; [2]98; [3]26; [4]4. Distillate wells: [5]1; [6]11; [7]3; [8]4.

SAVES MANPOWER!

Norris Clutch Type Valve Puller Eliminates Extra Pulling of Rods To Pull Lower Valve . . .

This is no time to *waste* precious manpower. This is an emergency that calls for the *conservation* of labor and the *saving* of time—and in pumping wells such a policy demands the use of the Norris Clutch Type Valve Puller. As part of your pumping string, this performance-proved device does *not* retard production or emulsify the oil. But it *is* ready at a moment's notice to pull the standing valve quickly, safely, positively, thus *saving* the extra run of the rods and the time and labor it involves. Desirable in peace, essential in war, it belongs in all pumping wells.

Norris Brothers, INC.
ROBINSON · ILLINOIS

can you identify
this oil product?

Many new and improved materials used for paving, roofing, saturated felt, briquettes, paints, shingles—even battery cases—owe their origin to oil. The general identification for the complex chemical composition of these oil derivatives is petroleum asphalt.

can you identify
good ROPE?

In general, any old rope will do—but for those oil men who know the importance of good rope, *New Bedford is the name.* Experienced oil men know New Bedford is worth asking for over and over again. It's worth the trouble in long service life and utmost trustworthiness in jobs of great strain. *Specify New Bedford.*

2860

NEW BEDFORD CORDAGE CO.
233 BROADWAY · NEW YORK 7, N. Y.
31 St. James Ave., Boston 16, Mass. · 325 W. Huron St., Chicago, Ill.
Mills: New Bedford, Massachusetts

Among the

Drilling Contractors

Three Drilling Firms Formed in Recent Weeks

Three new drilling firms have been formed in recent weeks through the country. **E. M. Nichols** has entered the business with offices at 500 Supply Row, Taft, Calif. **W. D. Appling Drilling Co.** is a newly formed Texas drilling company with offices at El Camp. Partners in the firm are Russell M. Johnson, Warren A. Smith, and W. D. Appling. **Suntex Drilling Co.,** Oklahoma City, has been granted a charter by the Oklahoma secretary of state. Suntex has $50,000 capital stock and was organized by F. W. Cooper, Carl Cooper, and A. J. Johnson, all of Oklahoma City.

Southeastern Drilling Co. has the contract for two Sun Oil Co. wells in Jefferson Davis County, Mississippi. They are the 1 C. F. Griffith, 300 ft. northeast of C NW NW 2-8n-19w, and the 1 Mrs. Emma S. Berry, C SW NE 28-9n-19w.

Delta Drilling Co., Evansville, and W. F. Lacy have brought in a producer in the Tunnell pool, Henderson County, Kentucky. Their 1 Arnett, 4-N-23, hit the Waltersburg sand at 1,782-1,810 ft. to swab 500 bbl. of oil per day. Delta has set surface pipe on a wildcat in the southwest corner of Henderson County, the C. Wood 1 Sauer, 16-Q-22.

E. K. Carey Drilling Co., McPherson, Kans., has taken a very favorable drill-stem test on a Derby Oil Co. Noble County, Oklahoma, wildcat. This test, the 1 Weigle, NE NE SE 2-21-2w, recovered 780 ft. of clean oil on a 25-minute test of the second Wilcox sand at 5,127-39 ft. Carey has a one-third interest in the well.

Rowan Drilling Co., Fort Worth, and Neville G. Penrose, Inc., are completing a producer, the 6 Walden, south outpost to Brunson Ellenburger pool, 15-22-37, Lea County, New Mexico. The outpost is being completed from 7,642-7,767 ft. after showing for 25 bbl. of oil per hour before casing was cemented on top of the Ellenburger. Rowan also has completed recently a new Devonian well in the south end of the TXL area,

B. R. Schabarum, left, equipment and engineering superintendent with Carl B. King Drilling Co., assisted in the design and installation of most of the new features of the company's new heavy rig, drilling its initial well in Wheeler field for Stanolind Oil & Gas Co. To the right of Schabarum are S. Jack Fogerson, driller, and crew members Danny Whisenhunt, Charley Hill, and A. G. Gray. A story outlining the new features of the rig, one of the heaviest in the Permian Basin, will appear in the July 5 issue of The Oil and Gas Journal

PENBERTHY
"REFLEX"
WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

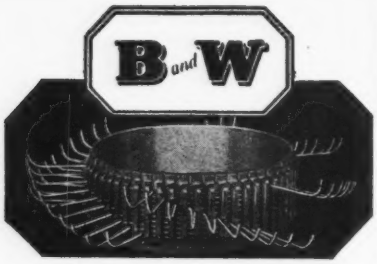
USE 'BESTOLIFE
IT'S BETTER

'BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years — is immediately available through more than 100 distributors in the U.S.A.

Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE — it's BETTER!

EXPORT: THE NATIONAL SUPPLY CORP., 30 ROCKEFELLER PLAZA, NEW YORK

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA



PATENTED & PATENTS PENDING

B & W Wall Cleaning Guides are effective—and safe—in cementing even the deepest wells

DON'T SQUEEZE!

It Ties Up Your Rig.

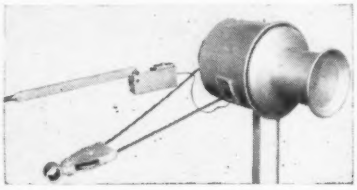
BRUCE BARKIS — B and W INCORPORATED — KENNETH WRIGHT

Well Completion Specialists

HOUSTON, TEXAS • LONG BEACH, CALIF.

KELCO *Safety*

BREAKOUT CATHEAD



The KelCo Safety Friction Type Breakout Cathead is designed to greatly reduce the breakout shock loads on drawworks, drill pipe and the cathead itself.

The tong line runs through a self-aligning sheave. This feature was designed for the modern high speed rigs to slow down the tong line giving the operator positive control in breaking the joint.

Parts 95% interchangeable with KelCo Spinning Line Cathead.

KELCO BEN F. KELLEY CO.
TULSA OKLAHOMA

Ector County, Texas. This well, the 5 J. E. Parker, Section 40, Block 45, T-1-S, T&P Survey, had a natural flowing potential of 490 bbl. of 41.2 gravity oil from pay at 7,767-7,878 ft.

Hewgley Drilling Co. is moving in derrick for an Amerada Petroleum Co. wildcat 13 miles northeast of Fayette, Fayette County, Alabama. This test is the 1 D. H. Wright, NW SW 8-15s-10w.

Kiowa Drilling Co., Wichita, is drilling a wildcat in Pawnee County, Kansas, its 1 Russell, NW NW NW 10-23-16.

Seran Drilling Co. et al are starting two wells in Okfuskee County, Oklahoma, the 2 Armstrong, SW NE NE 3-11n-10e, and the 1 Breco, NE SE NE 2-11n-10e.

Northern Drilling Co., Edmonton, Alta, has the contract for Globe-Leduc 2, LSD 9, 34-50-26w4, recently spudded in the new Leduc field southwest of Edmonton. The same company has contract for Rogers & Bailey 1, NE 5, 35-48-28w3, in the Lloydsask area.

BigWest Drilling Co., Dallas, has a prospective Ellenburger discovery in 1-12A T. G. Hendrick, 18 miles northwest of Albany, Shackelford County, Texas. The test, located in Section 8, AB&M Survey, Block A, recovered 240 ft. of clean oil on an 8-minute drill-stem test from 5,254-68 ft.

Helmerich & Payne, Inc., Tulsa, is drilling a cable tool wildcat for D. Harold Byrd and Jack Frost, 6 miles southwest of the Crockett field, Crockett County, West Texas. The test is the 1 Mayberry, Section 39, Block 31, H&TC Survey.

Tobe Wood, Wichita Falls, is the contractor for a North Texas wildcat, the Sam Letwin 1 Elliott, Section 974, TE&L Survey, 4 miles northeast of Woodson, Throckmorton County.

Bodard Drilling Co., Shawnee, Okla., has been issued a charter. The company was capitalized at $25,000 with three incorporators: N. T. Smith, J. M. Smith, and J. D. Bodard, all of Shawnee.

Texana Drilling Co. is the contractor for a 4,500-ft. wildcat, the L. E. Winslow 1 Lilly, C. C. Tutt Survey, 3 miles southeast of Shelbyville, Shelby County, East Texas.

Hayes Drilling Co., Mount Carmel, Ill., and Central Pipe Line have brought in a new field 4 miles west of Olney, Richland County, Illinois. This test, the 1 Harrell-Hunley, NW NE NW 35-4n-9e, struck the McClosky sand at 2,926-38 ft. and flowed 551 bbl. of oil in 6 hours.

Herndon Drilling Co., Lyons, Kans., is the contractor for a wildcat, the Stanolind Oil & Gas Co. 1 L. C. Repp, NE NE NW 29-28-17, Kiowa County, Kansas.

Henry Theck has spudded the Texas Co. 5 J. R. Handy on a 508-acre lease, Samuel Stewart Survey, Grayson County, North Texas.

Big Chief Drilling Co., Oklahoma City, and Vaughey & Vaughey recovered 980 ft. of clean oil at 6,172 ft. on a drill-stem test of 2 McGehee Unit, Lot 167, 9-6n-2w, LaGrange field, Adams County, Mississippi. Production is from Baker sand.

Broadlee Drilling Co. is erecting derrick for a wildcat, the Daryl Davis 1 S. H. Bolinger Co., NE SE 15-11n-3w, Choctaw County, Alabama.

Sam Sanders, Artesia, N. M., will drill a 2,500-ft. cable-tool test for Don M. Oliver and Fred F. Kotyza, Midland, Tex. It is the 1 Garner, 5 miles southeast of Artesia, and 3 miles west of nearest production in Empire field.

Delta Drilling Co., Tyler, Tex., has contract for Union Producing Co. 1 Campbell, in 20-12n-10w, Red River Parish, North Louisiana. It will be a

Standco NO-SMOKE

STANDCO BRAKE LINING

For the easiest brake known. It feeds off evenly. Standco never scores brake rims. See pages 3608-3613, Composite Catalog.

Standco Brake Lining Co.
HOUSTON

LOAD BINDERS

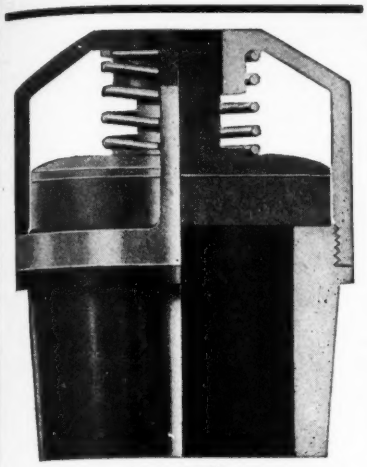
Drop-Forged • Malleable Iron • Steel

Drop-Forged • Heat Treated • 2 Sizes
Durbin-Boomer F-1—2 swivels, ⅜, ½ or ½" chain
Durbin-Boomer F-2—2 swivels, ½, ⅝ or ⅝" chain

Malleable Iron • Heat Treated • 5 Sizes
MIDGET No. 1—1 swivel, ¼" chain
DEI-TA No. 1—1 swivel, ⅜ or ½" chain
DIXIE No. 1—2 swivels, ⅜ or ½" chain
LONE STAR 1—2 swivels, ½, ⅝ or ¾" chain
LONE STAR 2—2 swivels, ½, ⅝ or ⅞" chain

Write for Catalog

DURBIN-DURCO
6611 Olive Street Road • St. Louis 5, Mo.



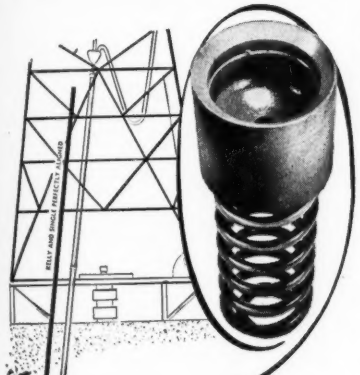
Patent Pending

Simplex Cage Type
PUMP VALVE

For all pipeline and refinery service. Extremely light and especially good for light fluids and long suction lines. Bronze or malleable cage; steel stem and body; reversible bakelite disc; hardened and ground steel seat. Since 1939, many thousands of these valves have proved their efficient performance in service in main line pipe line pumps.

L-K
PUMP VALVE CO.
P. O. BOX 901 • HOUSTON 1, TEXAS

RATCLIFF "JOINT AIDS"
REDUCE TOOL JOINT WEAR



Used in the bottom of the mouse-hole, a "Joint Aid" absorbs most of the weight of the Kelly when it is set down on the single in the mouse-hole. Kelly and single are kept in alignment while connection is being made . . . galled threads are eliminated . . . connections are faster and easier . . . you're back on bottom *quicker* with a "Joint Aid" in the mouse-hole.

Inquire about them without delay . . . they're made for all popular sizes of pipe and tubing, for any size mouse-hole. Cost? . . . so low that it will be offset by the prevention of just one galled tool joint.

OWEN TOOL COMPANY
ROUTE 9 BOX 800-E V-2-4341
HOUSTON, TEXAS

7,500-ft. gas test in the Evelyn area, and on the eastern border of the old De Soto-Red River oil field.

General Petroleums, Calgary, Alta., has received contract from Homestead Consolidated Oils for its first well in Leduc field, southwest of Edmonton. Location is 3½ miles due east of the discovery well. A heavy duty outfit is being moved in for the job.

Gene Reid Drilling Co. has reorganized as Gene Reid Drilling, Inc., with the following officers: E. C. Reid, president; R. L. Barnett, vice president and superintendent; O. E. Shehorn, vice president; and W. E. Kinney, secretary-treasurer.

Robert Martin, Brownwood, Tex., will be the contractor for a Caddo limestone test on his own lands in Brown County, West Central Texas, for H. H. Weaver. It is located in the J. C. Brown Survey 25, 3 miles southwest of Brownwood.

Bennett and Roberts Drilling Co. and Wilcox Oil Co. have staked location for 1 Crawford, SW SW SE 16-6-22, on a block of 2,460 acres 11 miles southwest of Ray pool, northern Graham County, Kansas.

General Petroleums, Calgary, Alta., has contract for B. A. Prycz 1, NW 25-50-26w4, the first well to be drilled by British-American Oil Co. in the Leduc field. The contract includes a preliminary shallow well to obtain gas for drilling. The same company has contract for Homestead-Leduc 1, LSD 7, 19-50-25w4, in the Leduc field.

Big Chief Drilling Co., Oklahoma City, has filed intention to drill the 1 Davis, SE NE SW 22-13n-1e, Oklahoma County, Oklahoma. This is a wildcat to 4,800 ft.

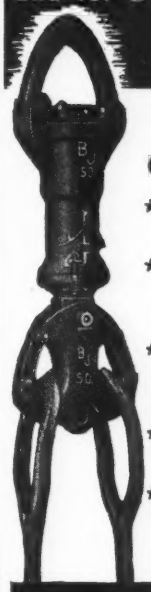
Miller Brothers & Bowling, Alice, Tex., has contract for Southern Minerals Corp. 1 A. R. Henderson, a scheduled 4,200-ft. southwest Concho County wildcat, in West Texas. Location is in the SE cor. Section 63, Block 8, H&TC Survey.

Lowell Drilling Co. has completed a producer in the Viola for a pump potential of 421 bbl. per day for Grover M. Simpson at his 1 Fee, SW NW NE 18-14-2, Saline County, Kansas.

H. M. Williams Drilling Co., Wichita, is moving in for the Alpine & Roy 1 Eshom, SE SW SW 35-22-3w, Harvey County, Kansas.

N. V. Duncan, who recently moved to Oklahoma from Fairfield, Ill., has discovered a new pool drilling a test for Danciger Oil & Refining Co. northeast of Shawnee, northern Pottawatomie County, Oklahoma. This wildcat, 1 Ailey, SW SW NE 2-10n-4e, got the Wilcox sand at 4,791 ft.

ON WORK-OVERS and for DRILLING-IN *Use*



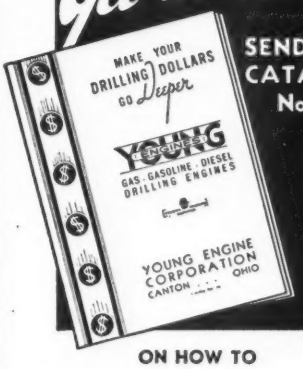
BJ
COMBINATION HOOKS

- ★ Hook has a soft spring with a full 5 inch travel.
- ★ It is made both with and without swivel locks as required.
- ★ Designed for direct connection to popular make traveling blocks.
- ★ Capacities from fifty to seventy-five tons.
- ★ Safety factor: 4 to 1.

Ask the BJ supplier.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York

Get the FACTS



SEND FOR CATALOG No. 20

ON HOW TO

Make your drilling dollars go deeper

WRITE TO

YOUNG ENGINE CORP.
2100 Allen Ave. S.E. Canton, Ohio

YOUNG PRODUCTS
Natural Gas Carburetors • Orifice Gas Well Testers • Heavy Duty Spudder • Electric Light Plants • Drilling Engines (Gas, Gasoline, Butane, or Diesel) • Under-road Boring Machine

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 21, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	45	23	0	*22	64,342	638	746	0	0	0	0	0	3	0	0	2	5
Pennsylvania	37	14	5	†18	61,507	1,337	1,910	0	0	0	1	1	0	0	0	1	1
West Virginia	17	1	16	0	43,987	359	333	0	0	0	0	0	0	0	1	0	1
Ohio	29	9	13	‡7	93,406	592	542	0	0	0	2	2	0	0	3	25	28
Indiana	13	6	0	7	25,484	267	152	0	0	0	2	2	8	0	0	22	30
Kentucky	16	5	2	9	31,609	276	214	0	0	0	2	2	6	0	0	22	28
Illinois	35	20	1	14	84,755	864	992	4	0	0	7	11	30	0	0	148	178
Michigan	19	10	2	7	37,149	342	366	0	0	0	5	5	5	0	7	99	111
Kansas	68	38	4	26	221,910	1,149	931	2	0	1	14	17	19	0	10	140	169
Neb., Mo., Iowa	0	0	0	0	0	2	9	0	0	0	0	0	0	0	0	2	2
Oklahoma	88	46	3	§39	314,151	1,851	1,110	3	1	0	17	21	40	3	6	315	364
Texas	173	108	7	58	690,824	3,966	3,783	6	0	3	32	41	137	25	41	604	807
North Central (Dist. 7B & 9)	60	28	0	32	164,812	1,238	1,348	3	0	0	14	17	50	0	7	201	258
West (Dist. 7C & 8)	56	48	0	8	239,869	959	782	1	0	0	3	4	13	0	3	71	87
Panhandle (Dist. 10)	9	6	3	0	27,019	199	168	0	0	0	0	0	1	0	1	2	4
Eastern (Dist. 5 & 6)	7	4	2	1	51,374	225	353	0	0	1	1	2	3	0	3	51	57
Gulf Coast (Dist. 3)	17	9	1	7	101,854	721	858	1	0	1	6	8	33	18	17	127	195
Southwest (Dist. 1, 2 & 4)	24	13	1	10	105,896	624	274	1	0	1	8	10	37	7	10	152	206
Louisiana	33	19	4	10	186,889	582	628	0	1	1	5	7	18	11	6	81	116
Northern	19	10	4	5	56,040	301	340	0	0	1	2	3	1	1	2	43	47
Southern	14	9	0	5	130,849	281	288	0	1	0	3	4	17	10	4	38	69
Arkansas	2	2	0	0	14,718	120	84	0	0	0	0	0	0	0	0	23	23
Mississippi	12	7	0	5	87,206	209	117	0	0	0	3	3	0	0	1	44	45
Southeastern States	1	0	0	1	3,348	22	21	0	0	0	1	1	0	0	0	19	19
Montana	7	3	2	2	14,412	101	140	0	0	0	1	1	1	0	1	12	14
Wyoming	3	2	0	1	17,621	99	79	0	0	0	1	1	7	0	2	16	25
Colorado-Utah	1	1	0	0	6,487	82	61	0	0	0	0	0	1	0	1	18	20
New Mexico	11	9	1	1	48,821	240	174	0	0	0	1	1	4	0	1	17	22
California	45	36	0	9	182,880	931	863	0	0	0	8	8	21	0	3	138	162
Total United States	655	359	60	236	2,231,506	14,029	13,255	15	2	5	102	124	300	39	83	1,748	2,170
Total previous week	644	325	78	241	2,326,572	13,374	12,678	12	1	5	92	110	285	37	78	1,646	2,046
Total June 22, 1946	577	303	48	226	1,815,383			11	1	0	73	85	237	23	55	1,498	1,813

Service wells included: *22, †14, ‡2, §1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.40	....	....	....
19-19.9	1.45	....	....	....
20-20.9	1.49	$1.55	....	$1.42
21-21.9	1.53	1.57	....	1.44
22-22.9	1.57	1.59	....	1.46
23-23.9	1.60	1.61	....	1.48
24-24.9	1.64	1.63	$1.86	1.50
25-25.9	1.68	1.65	1.88	1.52
26-26.9	1.71	1.67	1.90	1.54
27-27.9	1.75	1.69	1.92	1.56
28-28.9	1.79	1.71	1.94	1.58
29-29.9	1.82	1.73	1.96	1.60
30-30.9	1.86	1.75	1.98	1.62
31-31.9	....	1.77	2.00	1.64
32-32.9	....	1.79	2.02	1.66
33-33.9	....	1.81	2.04	1.68
34-34.9	....	1.83	2.06	1.70
35-35.9	....	1.85	2.08	1.72
36-36.9	....	1.87	2.10	1.74
37-37.9	....	1.89	2.12	1.76
38-38.9	....	1.91	2.14	1.78
39-39.9	....	1.93	2.16	1.80
40 and above	....	1.95	2.18	1.82

*For crude from Laboval, El Campo, and Sandy Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED JUNE 14

District—	Crude runs, daily avg.	Production (Thousands of barrels) Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	874	1,889	272	1,063	2,101	21,180	5,736	10,828	8,463
Appalachian:									
District 1	96	270	52	89	78	2,341	244	414	245
District 2	71	286	14	51	73	1,104	71	124	123
Ind., Ill., Ky.	818	2,854	284	870	986	17,541	1,500	3,566	2,898
Okla., Kans., Mo.	407	1,435	140	506	455	8,541	496	1,494	1,111
Inland Texas	241	1,046	93	147	429	3,565	271	364	710
Texas Gulf Coast	1,191	3,660	576	1,590	1,793	13,756	2,358	6,277	5,377
Louisiana Gulf Cst.	410	1,087	398	526	459	4,372	1,301	1,969	1,197
N. La. and Ark.	71	200	52	69	112	1,625	276	499	128
Rocky Mountain:									
New Mexico	9	40	2	10	19	85	12	38	37
Other Rocky Mt.	148	407	17	157	238	3,145	107	603	596
California	828	2,521	72	903	2,217	16,101	722	12,209	26,927
June 14, 1947	5,164	15,695	1,972	5,981	8,960	93,356	13,094	38,385	47,812
June 7, 1947	5,148	15,350	2,311	5,286	9,032	94,802	12,678	37,173	46,779
June 15, 1946	4,802	14,591	2,055	5,427	8,618	92,670	13,895	36,295	45,424

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 234,902,000 bbl. as of June 14—up 53,000 bbl. One year ago 220,106,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$1.95
Kettleman Hills, California*	1.84
Beauregard Parish	1.90
Illinois Basin	2.07
Pecos County, Texas (Yates)	1.65
Bradford, Pennsylvania	4.05
Eastern Ill. and Western Ind.†	2.07
Tomball, Texas Gulf Coast	2.10

*37°-37.9°. †35° and above.

TRENDS

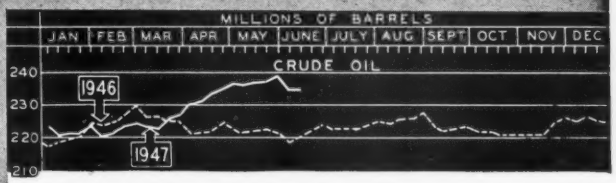
DAILY AVERAGE PRODUCTION FOR WEEK

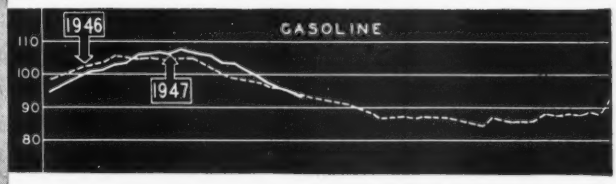
	June 21 crude oil	B. of M. June demand	June 14 crude oil
Alabama	1,150	1,200	1,250
Arkansas	82,200	79,000	81,450
California	918,700	884,000	914,800
Colorado	38,330	40,000	38,450
Eastern	65,600	65,400	64,500
Florida	140	600	1,060
Illinois	186,000	210,000	190,400
Indiana	17,700	18,000	18,800
Kansas	294,150	280,000	280,500
Kentucky	26,500	29,000	25,800
Louisiana	424,900	418,000	425,150
North Louisiana	103,500	.....	103,750
South Louisiana	321,400	.....	321,400
Michigan	41,485	46,000	51,060
Mississippi	95,400	87,000	95,500
Montana	25,300	24,000	25,090
Nebraska	550	600	600
New Mexico	106,000	103,000	106,000
Oklahoma	389,900	385,000	388,150
Texas	2,288,950	2,155,000	2,288,950
Dist. 1 (Southwest)	21,650	.....	21,650
Dist. 2 (Southwest)	166,550	.....	166,550
Dist. 4 (Southwest)	247,720	.....	247,720
Dist. 3 (Gulf Coast)	494,480	.....	494,480
Dist. 5 (Eastern)	39,950	.....	39,950
Dist. 6 (Eastern)	116,100	.....	116,100
East Texas Field	334,000	.....	334,000
Dist. 7-C (West)	39,000	.....	‡39,000
Dist. 8 (West)	560,750	.....	560,750
Dist. 7-B (W. Central)	39,500	.....	‡39,500
Dist. 9 (N. Central)	141,500	.....	141,500
Dist. 10 (Panhandle)	87,750	.....	87,750
Wyoming	120,340	114,000	120,380
Miscellaneous	.....	200	.....
Total United States	*5,123,295	4,940,000	5,117,890
Change from prev. wk., up	5,405		

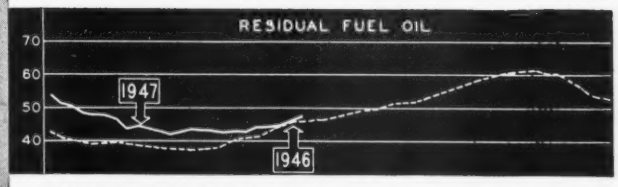
Total production January 1-June 21 ..... †843,755,165 bbl.
Same period last year (crude plus cond.).. 801,842,439 bbl.

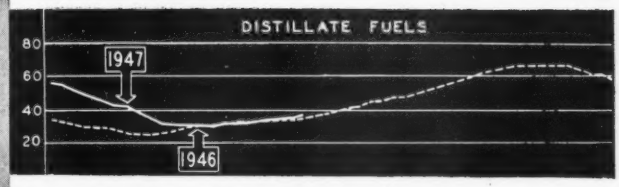
*Not incl. 33,000 bbl. condensate. †Incl. 4,907,870 bbl. condensate. ‡Revised.

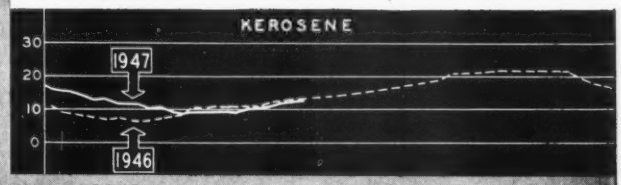
OIL STOCKS IN THE UNITED STATES



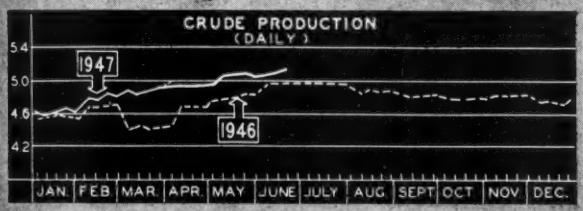


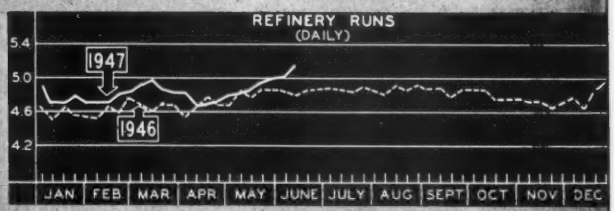




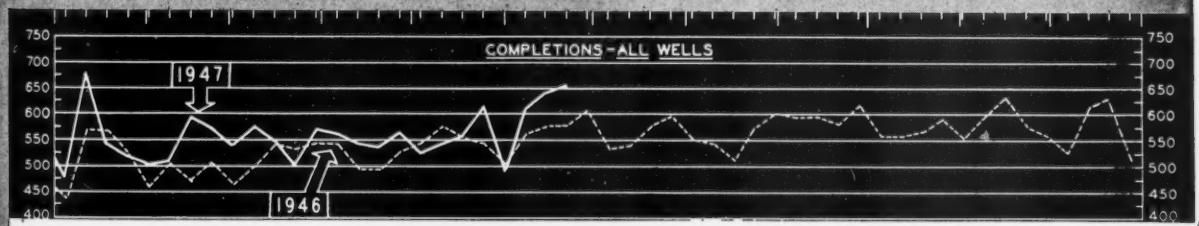


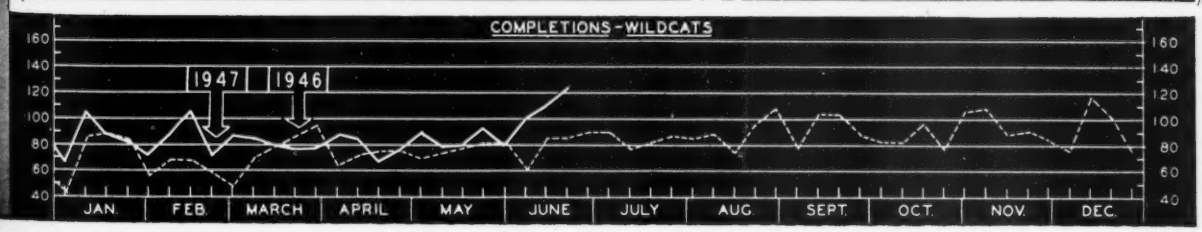
DAILY OPERATIONS

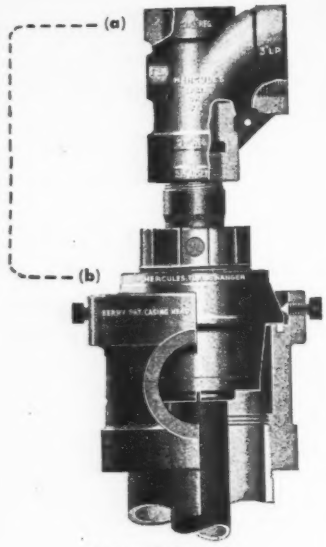




Solid line charts weekly completions, service wells in Eastern area included.







FULLY PATENTED

WHAT A DIFFERENCE...

HERCULES PUMPING WELL HOOK-UP MAKES!

Note how the Hanger sits down in the casing head out of the way; the compactness of the entire hook-up . . . reducing the number of connections necessary in connecting a well the old way.

(a) Hercules Pumping and Flowing Tee is the original and only Tee with a combination Plain and EUE thread. (Supplied in any combination.) Heavier and stronger than an ordinary Tee.

(b) Hercules Forged Steel Tubing Hanger—with Forged Steel Slips on which tubing hangs—affords absolute tubing protection. Has the FAMOUS Hercules Packing above slips with threaded nut to distort packing, independent of tubing weight. (Fits any Berry Pattern Casing Head.)

Sold at all supply stores

HERCULES TOOL COMPANY

TULSA, OKLAHOMA, Box 286
EXPORT OFFICE: 30 Rockefeller Plaza
NEW YORK, U.S.A.
CABLE ADDRESS: HERTOCO

MARKETS

A STEADY increase in demand for gasoline, coupled with a proportionate increase in its scarcity, marked the petroleum-products market in the Mid-Continent area last week.

Most suppliers reported gasoline unavailable on the spot market with contract commitments absorbing all the product being manufactured. One Kansas dealer was reported cut off by a refiner after 19 years as an exclusive account.

Light burning oils vied with motor fuel in scarcity, with kerosine and No. 2 in particularly strong demand. Some shipments of No. 2 were reported moving at 6.875, a new high and well above the average tank-car price.

Throughout the products market, a scarcity of material and a continued shortage of tank cars combined to create a wide spread between the low and high spot sales and quotations.

No. 6 May Rise

Belief that No. 6 fuel may go still higher was indicated as some contracts for delivery over the next year were arranged to provide for prices in excess of current market prices.

In New York Harbor, Socony-Vacuum Oil Co., Inc., announced an increase of 30 cents a barrel for No. 6, bringing its posting to $2.50. Other suppliers did not immediately follow suit, and some expressed the opinion the new price would be modified. A 20-cent increase also was posted for No. 5. Marine fuels were not affected.

One large eastern refinery was reported to have shifted from fuel oil to coal in an effort to conserve the heavy fuel. It was estimated the changeover would result in a saving of 1,000 bbl. of No. 6 daily.

In Pittsburgh, steel companies were building storage facilities for large amounts of heavy fuel as a reserve fuel supply for the 1947-48 season. Some industrial plants which converted from coal to fuel oil several months ago were reported preparing to shift back to coal.

Crude Rumors Spiked

Rumors of a pending increase in crude-oil prices received a setback during the week with the statement by Eugene Holman, president of Standard Oil Co. (N. J.) that current crude prices are considered high enough. Lack of a crude increase, however, was not expected to prevent scattered increases in the prices of products.

Talk of shortages continued to be heard throughout the industry. Max W. Ball, director of the Oil and Gas Division, Department of the Interior, predicted spotty gasoline shortages beginning late in July. A severe "deficiency" of fuel oil, light burning oils, and liquefied petroleum gases was forecast for the coming winter.

Ball emphasized the basic shortage is not of petroleum, but of transportation facilities. Refinery capacity of 130,000 bbl. daily is now shut down because of lack of pipe lines and other facilities for transporting the crude, he said. The available capacity, he said, is in Oklahoma, Kansas, Michigan, Illinois, and Indiana.

While refiners felt the price of gasoline might rise independent of any change in the price of crude oil, most felt the recent boost in the price of natural gasoline would have little, if any, effect on motor fuels. In that increase, the natural product jumped ¼ cent a gallon on both 26-70 and 18-55.

Representative Quotations

Representative spot-market quotations of leading suppliers as of June 23, 1947. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	8-8.5	10.1-10.4* 9.3-9.5†	8.5-9.25
Premium gasoline, 78-80 octane	8.75-9.5	10.2-12	9-9.5
42-44 w.w. kerosine	7-7.375	7.8	6.875-7.125
No. 2 straw fuel oil	6.125-6.875	6.8-7.1	6-6.25
No. 6 residual	$2.00-2.45	$2.32-2.50	$1.80-2.35

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.625	5.125	5.375
Grade 18-55	6.75	6.15	6.45

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	11-12.5
750 vis., No. 3-4 neutral	13-15.25
2,000 No. 5-6 neutral	14.5-16.75

LUBRICATING OILS

Mid-Continent

150-160 vis. D bright stock, 0-10 p.p.	29
200 vis. No. 3 neutral, 0-10 p.p.	18

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	43
180 vis. 0 p.t. neutral	43

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7.75

Equipment Men in the News

H. W. Bevarly has been appointed to the post of assistant chief engineer of the Girdler Corp.'s Votator Division.

A. E. "Chick" Hickman has been promoted to district manager of the Texas Panhandle area of Bethlehem Supply Co. "Chick" came with the company in February 1945, as store manager and field representative of the Pampa, Tex., store. Prior to his affiliation with Bethlehem Supply he was associated with the lumber industry in Kansas, Oklahoma, West Texas, and the Panhandle area for 12 years.

N. C. Michels, formerly a member of the engineering staff of the Gary Steel Works of Carnegie Illinois Steel Corp., has been appointed chief engineer of Laclede-Christy Clay Products Co., St. Louis. **E. H. Krautheim** has been appointed assistant chief engineer in charge of plant engineering and maintenance, and **Les Mueller,** assistant chief engineer of the arch and wall division. **Herman W. Weber,** formerly chief engineer of the arch and wall division, has been added to the executive staff as consulting engineer. **John B. Ives** has been appointed manager of operations. **Paul J. Maddox,** assistant vice president of the company, has been appointed general sales manager of the refractories division.

Robert F. Davis of 3738 Bryant Avenue, Minneapolis, has been appointed a communications field engineer for Motorola, Inc., with headquarters in Denver. His territory will cover the states of Colorado and Kansas.

J. M. Davies has been promoted associate director of research in administrative charge of the department of research, Caterpillar Tractor Co., and **R. C. Williams,** assistant director of research in charge of tractor and earth-moving projects. The present assistant directors of research, **L. A. Blanc, W. L. H. Doyle, C. R. Maxwell,** and **C. R. Schad,** have been assigned additional duties in step with the expanding postwar necessity for advanced and efficient machinery.

E. H. Vockrodt, of 3757 Wilshire Boulevard, Los Angeles, has been appointed Pacific Coast representative by Alloy Steel Products Co., Linden, N. J., manufacturers of corrosion-resisting valves and fittings.

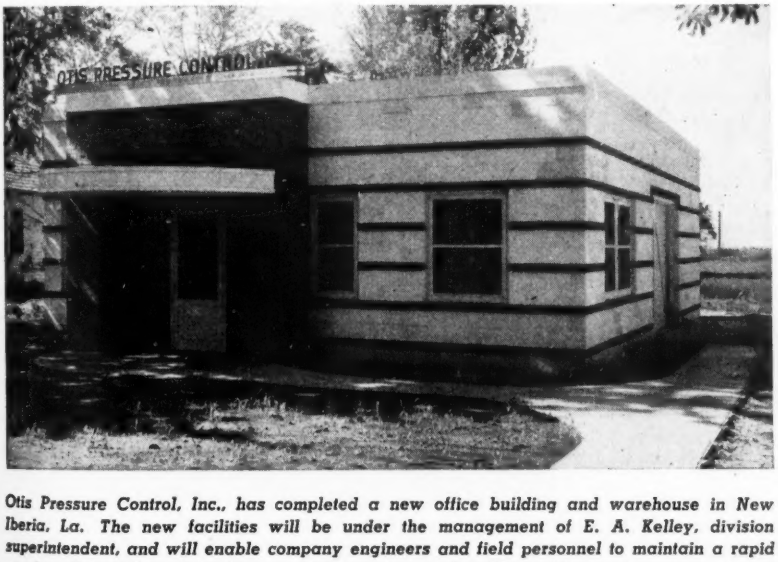
Richard T. Spear has been appointed a regional sales manager for All-State Welding Alloys Co., Inc., White Plains, N. Y. His territory includes eastern Pennsylvania, south New Jersey, Virginia, West Virginia, Delaware, Maryland, and District of Columbia.

Charles Trimble, district manager, and **James T. Adams,** sales engineer, have opened a new district office for Nordberg Manufacturing Co. in the Cotton Exchange Building, Dallas.

Eugene L. "Gene" Craig has been named sales manager for International B. F. Goodrich Co. in the Territory of Hawaii. Craig will have headquarters in Honolulu and have charge of the sales of all the company's products in the Hawaiian Islands.

Export Division of R. G. LeTourneau, Inc., Peoria, Ill., opened a new sales office at 37 Wall Street, New York, on June 2 under the direction of **Paul King,** assistant export manager. This office provides maximum service to the firm's export trade and offers convenient company contact for visitors entering the United States through New York City. Also located at 37 Wall Street is **Robert F. Nelson,** vice president and assistant to the president. His office was formerly 120 Wall Street.

Weston Electrical Instrument Corp. has announced the election of these officers: **Edward F. Weston,** chairman of the board; **Caxton Brown,** chairman of the executive committee; **Earl R. Mellen,** president; **H. Leigh Gerstenberger,** vice president in charge of sales; **Reginald R. Lambe,** vice president in charge of manufacturing; **John H. Miller,** vice president and chief engineer; **Ross Nichols,** secretary and treasurer; and **F. G. Hawthorne,** comptroller and assistant secretary.



Otis Pressure Control, Inc., has completed a new office building and warehouse in New Iberia, La. The new facilities will be under the management of E. A. Kelley, division superintendent, and will enable company engineers and field personnel to maintain a rapid service of installing subsurface controls, running and pulling tubing under pressure, and tubing corrosion surveys

Robert A. Olen, general manager of The Four Wheel Drive Auto Co., has been elected a member of the board of directors to succeed Charles Hagen, deceased.

Harry W. Griffith, who has been an engineer in the research laboratory at the Ambridge, Pa., plant of The National Supply Co., has been appointed field engineer for the company's Spang - Chalfant Division and will have his headquarters in Caracas, Venezuela. Griffith, a graduate in mechanical engineering of University of Pittsburgh, has been with the tubular division of the company since 1937.

Eugene McElvaney, vice president of the First National Bank in Dallas, was guest and principal speaker before the Mississippi Bankers Association at its annual convention recently held at Biloxi, Miss. McElvaney, long recognized as a prominent figure and authority in oil financing by both bankers and oil men alike in the Southwest, chose as his subject for the occasion "Oil in Your Back Yard."

Alden R. Loosli has been appointed assistant sales manager, rubber chemicals department of Calco Chemical Division, American Cyanamid Co. He is a member of the American Institute of Chemical Engineers, the Salesmen's Association of the American Chemical Industry and the Engineers' Club of Plainfield, N. J.

The annual shareholders' meeting of Franklin Supply Co. was recently held in the general offices at Chicago. **Stanley Martin,** Glenview, Ill.; **Roy Wood,** Hammond, Ind.; **Lawrence Harper,** Mount Pleasant, Mich.; **Leland H. Strouse,** Evansville, Ind.; and Jene Harper, Glenview, Ill., were elected directors for the ensuing year. Officers elected by the directors are: Jene Harper, president; Stanley Martin, vice president; **Albert J. Mitchell,** treasurer; and **Jean Harper,** secretary.

Atlas Tool & Designing Co., Philadelphia, has changed its charter to Atlas Chain & Manufacturing Co.

Pittsburgh Plate Glass Co., Pittsburgh, has acquired the business of Forbes Varnish Co., Cleveland. The new unit will continue operation as the Forbes Finishes Division of Pittsburgh Plate Glass Co.

John A. Worthington has been appointed general sales manager of the Piston Ring Division of Koppers Co., Inc. **T. Latimer Ford,** who has been with the company or its affiliates since 1908, will head a new company department devoted exclusively to replacement sales.

The Chicago regional office of Minneapolis-Honeywell Regulator Co. and its industrial division, Brown Instrument Co., has moved to a new location which will provide three times as much space as former quarters. The new office, at 351 East Ohio Street, occupies the entire top floor of the building and provides 30,000 sq. ft. of floor space. The Chicago regional office supervises activity and branch offices in various cities of Wisconsin, Illinois, Michigan, Indiana, Kentucky, Tennessee, Missouri, Arkansas, Kansas, and Iowa.

Sales representatives of The Four Wheel Drive Auto Co. from all over the United States met at the home office of the company in Clintonville, Wis., on June 19-20 for their first annual all-zone conference. Highlighted by a slate of outstanding authorities on American business methods, the 1947 meeting emphasized the position of the salesmen in the free-enterprise system.

A partnership has been formed by **Ray M. Sexton** and **J. M. Davis** to be known as Industrial Painting Co. The company will specialize in oil-field and industrial painting contracting. Davis will be in charge of field operations. Sexton will be acting manager. The company will maintain headquarters in Tulsa.

Announcement of the retirement of **Charles F. Kettering** as vice president in charge of the Research Laboratories and of **John Thomas Smith** as vice president and general counsel was made by General Motors Corp. following the annual organization meeting of the board of directors. Both of these executives have reached the normal retirement age. **Charles L. McCuen**, vice president in charge of the engineering staff, will become general manager of the Research Laboratories Division, succeeding Kettering. **James M. Crawford**, who has been general assistant to McCuen, was elected vice president in charge of the engineering staff to succeed McCuen. **Henry M. Hogan**, vice president and assistant general counsel, was elected general counsel to succeed Smith. All other officers of the coporation were reelected. Smith will continue to serve as a director of the corporation and as a member of the financial policy committee. Kettering likewise will remain a director and will be a consultant.

Harry E. Kellogg, secretary and treasurer, Link-Belt Co., Chicago, announces expansion of the financial staff of the company by appointment of **Franklin C. Schimpf** as controller, with headquarters at 307 North Michigan Avenue, Chicago. Other accounting and financial department changes have resulted in the following organization: **F. H. Brandt**, general auditor; **M. P. Anderson**, assistant treasurer; **H. C. Oakes**, assistant treasurer; **H. W. Aden**, assistant secretary; **C. W. Marum**, credit manager.

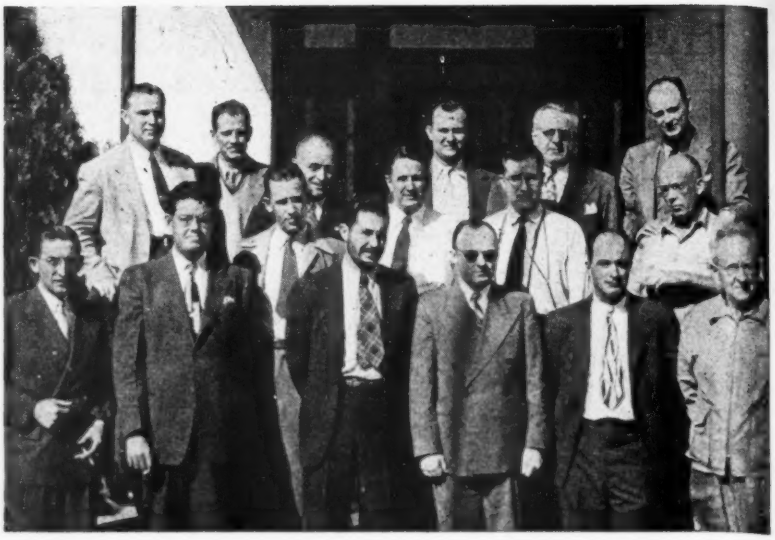
JOHN T. CONDON

J. C. HAMMELEF

John T. Condon has been appointed a sales executive of the Chrysler Division, Chrysler Corp. As such, Condon becomes a member of the general sales staff, whose other members are **Stewart W. Munroe**, general sales manager; **Joseph A. O'Malley**, assistant general sales manager; **Earl B. Wilson**, director of sales, and **Roy H. Appleman**, sales executive, with **David A. Wallace**, president, heading the group as well as all other divisional activities. **John C. Hammelef**, who succeeds Condon as manager of the industrial engine division, joined the Chrysler Division in June 1933, as a member of the staff of the planning department of the Jefferson plant.

Return of **Robert C. Medearis** to the Mid-Continent area is announced by Patterson-Ballagh, Division of Byron Jackson Co., manufacturers of oil-field specialties. Under **J. P. Magoffin**, district manager, whose office serves the entire Mid-Continent, Medearis will be working out of Houston.

E. Burk Estabrook, of Lanes' End, Schoolhouse Lane, Philadelphia, addressed Swedish engineering societies on "Automatic Temperature Control in Industrial Processes" at Stockholm on June 5. Estabrook, who is connected with the sales department of Leeds & Northrup Co., makers of high-precision electrical recording and controlling instruments, was assigned by the company to make the journey at the invitation of the Royal Swedish Academy of Engineering Sciences and the Association of Swedish Technical Physicists, with which the Swedish Metallographers' Association and the Swedish Association of Mechanical Engineers are cooperating. Before returning to Philadelphia, Estabrook will visit various plants in Sweden, England, and France.



Franks Manufacturing Corp.'s sales and service executives and branch office managers are shown at the Tulsa plant following a staff sales meeting the first week in June at the Tulsa headquarters. In the back row are: Clair Simmons; L. E. Ferguson; M. G. Scott; S. E. Corry; Carl White, Jr., president, and R. E. Kirberger, sales manager. Center row: Albert Hastings, V. K. Chapman, Joe Byrd, and A. J. Rogers. Front row: Vern Alley; Doug Lawrence; Tommy Knoblock; Leslie Brooks of Brooks-Keefe Advertising Agency, advertising counsel for the firm; Ken Lamer, and Mike Pallein. Not shown in the photograph are: George Lewis, John Howard, Don Turner, and John Leyh

Refreshments and dinner were served to visitors estimated to number about 4,000 persons who attended the open house held recently at the Los Angeles plant of Joseph T. Ryerson & Son, Inc. Hosts were **F. A. Purdy**, plant manager, and **T. L. Kishbaugh**, assistant manager. The new plant has been in operation since October 1946.

The story of oil is told in a new 2-reel, 22-minute, 16-mm. sound motion picture in color entitled "Power That Brings You Oil." The picture develops the story in a way which will familiarize the average layman with the ramifications of the petroleum industry. Beginning with the currently accepted means of exploration, the motion picture—which stresses the importance of men and the power at their disposal in producing and refining petroleum—traces the industry's operations through each of its integrated divisions. Available for showing to interested groups, this film may be procured from the consumer relations department of International Harvester Co., 180 North Michigan Avenue, Chicago.

Kenneth H. Klipstein has been appointed an assistant general manager in charge of the development department, and **V. E. Atkins**, manager of manufacturing of the Calco Chemical Division, American Cyanamid Co. **Ames B. Hettrick**, formerly an assistant manager of the pigment department, has been named assistant manager of manufacturing, and **L. M. Phelps** will assume the post of plant production manager, Bound Brook plant, formerly held by Atkins. **F. W. Zipf** was named assistant to the manager of production.

William G. Findlay has been appointed manager of the Pittsburgh plant of Joseph T. Ryerson & So., Inc. He succeeds **Howard L. Robinson**, who has been given a special assignment at the Cleveland plant of the company.

John W. Brown, sales engineer, Mason-Neilan Regulator Co., has been appointed manager of the company's San Francisco office located at 198 Second Street. Brown is a mechanical engineer, formerly with the instrument department of Standard Oil Co. of Ohio. He came to Mason-Neilan in 1945, spent over a year in the engineering department, then became sales engineer in Mason-Neilan's Pittsburgh office.

Incorporation of a new Canadian subsidiary with offices and warehouse in Toronto and Montreal is announced by The General Detroit Corp., Detroit. The new subsidiary, called The General Detroit Corp., Canada, Ltd., will serve the entire Dominion in the same way that General's other subsidiary, The General Pacific Corp., Los Angeles, serves the United States west of the Rocky Mountains. Heading the new Canadian subsidiary will be **Maj. Harris Popplewell**, recently discharged from the First Canadian Army, and formerly associated with Canadian National Carbon Co.

Dr. Charles Allen Thomas of St. Louis, vice president and technical director of Monsanto Chemical Co., was elected executive vice president at a recent meeting of the company's board of directors. Concurrently **Felix N. Williams** of Springifeld, vice president and general manager of the company's Plastics Division, was elected to the board of directors. At the same time, five additional vice presidents were elected to the board. They are: **Josiah B. Rutter** of Everett, Mass., general manager of the company's Merrimac Division; **Dr. C. A. Hochwalt** of Dayton, director of the central research department; **William W. Schneider** of St. Louis, secretary of the company and head of the legal department; **Daniel M. Sheehan** of St. Louis, comptroller; and **C. A. Wolfe** of St. Louis, director of purchases and traffic.

Classified Advertising

The Market Place for the Oil Industry

EQUIPMENT FOR SALE

WANTED: Best offer on 100—13⅜" and 150—8⅝" API 8 V-Thd. Smith Steel new couplings. H. C. Bennett, Box #31, Augusta, Kansas.

FOR SALE: Six New Kobe, 2½ inch tubing insert, pumps, one Triplex—Bargain for immediate sale. Ben Beckham, Jr., Box 134, Overton, Texas. Phone 3921.

FRANKS Model F-47 shot hole drill on 1942 1½ ton Chevrolet, and 500 gallon water truck. Price $6000.00. Box B-777, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Shaffer power draw works, powered by two J. L. 1335 Buda engines compounded. Suitable for 5,000 foot work. In A-1 condition. Price $7,500. Terms. Melton Well Service, Box 1360, Seminole, Oklahoma.

NEW WELDED STEEL TANKS: Used Welded & Bolted Steel Tanks, Grain Tanks, 8—5,000 bbl. New A.P.I. Bolted Steel Tanks, 3—10,000 bbl. New A.P.I. Bolted Steel Tanks. Reset tank work. Independent Tank Co., Seminole, Oklahoma, Box 192, Phone 977.

FOR SALE: Three Double Drum Cardwell Spudders, 2 R.L.'s and 1 K, all have double 55-foot masts and mud boats, complete with toolhouses, light plants and tools. These spudders are in A-1 condition. Priced reasonable. Thompson Drilling Company, 122A N. Locust Street, Centralia, Illinois.

Model 200 Sullivan Drill mounted on 1941 tandem White truck, complete with all drilling accessories, 1800 ft. 2⅞ in. drill pipe, 5 x 8 Gardner-Denver Pump, Kohler light plant, etc. Purchased new in May 1945. Never drilled below 1500 ft. Located at Grandfalls, Texas. Write Box 1022, or call 813 Del Rio, Texas.

FOR SALE: 10,000 sq. ft. steel airplane landing mat, 15" x 10' Sections. Will make into portable all-weather lease road for hauling equipment, etc. 10c per sq. ft., F.O.B. Tulsa, Oklahoma. Subject to prior sale or withdrawal. Also have several light plants at bargain rates. Marshall Travis, 110 Midco Bldg., Tulsa, Oklahoma. Phone 5-2251.

EQUIPMENT FOR SALE

FOR SALE: 250 new 8⅝" OD 32# 8V Thread seamless steel couplings located at Oklahoma City. Price $4.50 each. Cities Service Oil Company, H. D. Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—6500 G Caterpillar engine with Foote double reduction geared unit complete with two Bovaird straight lift jacks, rod lines and Norris counterbalance to pump two wells. Jay Kornfeld, Phones 4-2121, 6-5202, 1121 Union National Bank, Wichita, Kansas.

1 SUPER Wilson 46 Model, single drum, A mast telescoping pole, Buda Motor, mounted on GMC tandem truck. 1 H Cardwell 46 Model, single drum, 8 x 10 telescoping pole, mounted on tandem Studebaker. 1 Wilson Super skid job. Equipment can be seen at Pauls Valley, Oklahoma. Telephone 2032, Henderson, Ky.

FOR SALE: 4 slightly used Barrage Balloon winches. These are built for relatively light loads at high speed. Have large drums for long length of light line. Direct connected to 50-70 horse 6 cylinder Waukesha motor with clutch and three speed transmission. Should be useful for exploration or testing. Price less than motor cost. P.O. Box 4313 Memphis, Tenn.

FOR SALE

100—New 500 gallon steel oval horizontal tanks 39" x 51" x 72", skid mounted, 16" manhole, hose racks, gate valves, hose turnbuckles, export packed.

ROGERS AND WRIGHT, Inc.

P.O. Box 1572 Charleston 26, W. Va.

EQUIPMENT FOR SALE

1—New R. L. Double Drum Cardwell Unit powered with WAK Waukesha engine; 1—R. L. Model, Double Drum Cardwell in first class condition, new MO-893 Buda engine, new bearings in jack shaft and lower drum and relined brakes. Both good buys. Write Box B-774, The Oil and Gas Journal, Tulsa, Oklahoma.

Executive Aircraft For Sale

Lockheed Lodestar, Model 1856, NC 75220, with 9 airline seats, writing table, rest room.

Powered by two Wright 1820-87 engines.

Total Airframe Time: 1295 hrs. Left: 673 hrs.

Total Time Engines: Right 295 hrs. Left: 295 hrs.

Time since Major: Right: 65 hrs.

$32,500, F.A.F., New Orleans

GULF AIRWAYS, Inc.

302 Balter Building

New Orleans 12, Louisiana

Tel.: MAGNOLIA 6815

New and Reconditioned

VALVES and FITTINGS

VICTORY SUPPLY COMPANY

Phone 5-2073 P.O. Box 754

Tulsa, Oklahoma

FOR SALE

STEEL STORAGE TANKS

26—10,000 Gallon Capacity Tank Car Tanks

CLEANED PAINTED TESTED

Located in Oklahoma

IRON & STEEL PRODUCTS, INC.

42 years' experience

13412 S. Brainard Avenue

Chicago 33, Illinois. PHONE BAYport 3456

"ANYTHING containing IRON or STEEL"

LEAD COVERED CABLE

New—On Original Reels—Standard Construction

No. 2 Stranded 3 Conductor—Type RL, 600 Volts

270 Rolls—Approx. 500 ft. ea.—6 Rolls—Approx. 1500 ft. ea.

Priced to Sell F.O.B., K.C., Mo. **46c Ft.** Quantity Discounts 6 or more reels.

Brand New WIRE ROPE

On Original Reels 400,000 ft. Hemp Center

200,000 ft.—¼"—6 x 19 Improved Plow Steel Galvanized

160,000 ft.—¾"—6 x 37 Improved Plow Steel Preformed

15,000 ft.—⅜"—6 x 12 Plow Steel Galvanized

6,000 ft.—1¼"—6 x 37 Plow Steel Galvanized

19,000 ft. 1¼"—6 x 37 Plow Steel

Substantial Discounts on Large Quantities—Savings Up to 50%

Immediate Delivery—Write, wire or phone

BROWN-STRAUSS CORP.

Box 78—Phone HA. 1000 Kansas City 10, Mo.

FOR SALE

10 Blowers (Roots Connersville) size 16" x 18" connected to G. E. induction motor, 200 H.P., 3 phase 60 cycle, 2200 Volt, 705 RPM.

3 Blowers (Roots Connersville) size 20" x 23" connected to Westinghouse Electric induction motor 350 H.P., 3 phase 60 cycle, 2200 Volt, 590 RPM.

ALSO

Diesel Engines
Turbo Generators
Boilers
Centrifuges
Distilling Plants
Diesel Generators
Turbo Blowers
Pumps
High Pressure Compressors
Heaters
Heat Exchangers

Hugo Neu Corporation

31 Nassau Street

NEW YORK 5, NEW YORK

Telephone: Rector 2-1334

EQUIPMENT FOR SALE

FARM TELEPHONES. New model hand-set wall telephones for farm lines—prompt delivery by parcel post. Write: Farm Telephone, Dept. 116, Rogers Park Station, Chicago 26, Illinois.

FOR SALE: Pumping Units. All types & sizes. New and used. Bridgeports, Jensens, Americans, Atlas, Ideco, with or without Power. Glenn Supply Co., 3600 Sand Springs Road. Phone 3-9607, Tulsa, Okla.

FOR SALE: All kinds of atmospheric coolers, Tulsa, Coynoco and GR, all in first class condition. ENGLE PETROLEUM, INCORPORATED, P. O. Box 72, Mt. Carmel, Illinois.

FOR SALE: K Type Spudder complete set tools 10″ down 5½″—$3500. 2000′—⅞″ Cable, new $200. Pipe pulling machine—equipment line block and elevators, 2 Page Jacks—$250. Bessie Metzger, Dewey, Okla., Phone 335.

COMPLETE 7500′ STEAM RIG

All units in excellent condition and ready for immediate delivery. Includes 3—125 h.p. 300 lb. pressure Kewanee boilers with all fittings; 2—10 x 4½ x 10 National Transit Pumps for water system; 1—12 x 12 Ideal steam engine; 1—7½ RR Emsco Draw Works; 2—7½ x 18 Ideal steam mud pumps with all fittings. Priced for quick sale. Write, Wire or Phone.

THE BREWSTER COMPANY, Inc.
Shreveport, Louisiana

PARTS FOR ARMY TRUCKS

New and Used

Largest stock in America, 6x6, 6x4, 4x4, 4x2. All items guaranteed. Largest auto wrecking house in the west with most complete stock of new and reconditioned parts for all cars and trucks. Fast service.

PIONEER AUTO WRECKING CO.

752 W. 13th Ave. Denver 17, Colo.

EQUIPMENT FOR SALE

CATERPILLAR D-13000 Diesel Power Unit, completely rebuilt. Open Clutch with Outboard Bearing. Martin Tractor Co., Chanute, Kansas.

FOR SALE: Two second hand Acme 125 hp. 200-250 working pressure boilers, in good condition, complete with boiler pumps and Fairbanks-Morse 4 x 6 unit. Viking Oil Company, 1620 Alamo National Building, San Antonio, Texas.

FOR SALE: Have purchased lease and equipment on a partly developed 160 acre water flood property, total depth 360 feet, complete plant including Mississippi Lime water well, electrically operated pressure-filter plant, good tankage, lease house. Too good to wreck. F. W. Black, Paola, Kansas.

WE BUY and SELL

Steel Pipe and Tubing
Pipe Fittings—Well Casing
Culverts and Valves

SONKEN-GALAMBA CORP.

2nd & Riverview, Kansas City 18, Kans.

EQUIPMENT FOR SALE

FOR SALE: New 5″ x 10″ Worthington TYPE KMS-1 Pump. Box B-733, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1—14″ x 14″ Ideal horizontal twin cylinder steam drilling engine. 3—15½″ x 8½″ x 20″ Ideal steam slush pumps. Excellent condition. Priced right.
Lucey Products Corporation, Tulsa, Oklahoma.

1 STAR 45 ST Spudder with Hercules engine. Both in excellent condition. No tools. Located 10 miles East of Drumright, Okla. 1 Ft. Worth Super D Spudder with practically two strings of tools, located on Lysite Mountain, Wyoming. Travco Equipment Company, 110 Midco Bldg., Tulsa, Oklahoma. Phone 5-2251.

LATEST TYPE
DIESEL AIR COMPRESSOR
300 H.P.

Clark Right Angle Model D32, 3 Cylinder 14″ bore 14″ stroke Air End 21″ and 12½″. Complete with all equipment, wrenches, etc. Machine operated only three months in Clarks Dresser Plant at Bradford. Now located near Bradford, Penna. Crated for immediate shipment.

Price One Half of Present Quotation
Address:

NORTHERN ORDNANCE INC.
W. M. Cordner—Sales Manager
Minneapolis, Minnesota
Telephone: Granville 7201

SPECIAL OFFERING

NEW • CRATED FOR EXPORT • IMMEDIATE DELIVERY

50—New Gaso Fig. #1860 Pumps, 2½″ x 4½″ Bore x 6″ Stroke (Removable Liners 2¾″ in Pumps) Totally enclosed Duplex Power Pumps, Timken Bearing Equipped, Side Pot Type Fluid Cylinder, Bronze Wing Guided Valves, Stainless Steel Piston Rods, complete with 28.8 PD 5-C Groove, 5-158C V-Belts, All Weather Belt Guard, Mounted on Steel Skids, With Spare Parts, Tools & Etc. Weight 3410#. Price F.O.B. Tulsa, Oklahoma ..... $650.00 Ea.

25—Same as Above with Model C-36-6419 Chrysler 8-Cylinder Industrial Engine, Complete with Clutch, Penn Switch, Battery Box, Tool Box, Mounted on Steel Skids and Miscellaneous Spare Parts, Tools & Etc. Weight 3640# Price F.O.B. Tulsa, Oklahoma $1485.00

50—New Byron-Jackson 3″ 2-Stage Pup Centrifugal Pumps, Parallel Hook-Up 650 GPM 185-PSI 2400-RPM, Series Hook-Up 325-GPM 360-PSI 2400-RPM, Ideal for Gasoline—Crude & Water, Less Chrysler Engines. Price F.O.B. Tulsa, Oklahoma ..... $300.00 Ea.

All Subject to Prior Sale

H. A. McCARTHY

310 Thompson Bldg., Tulsa, Oklahoma. Phone 5-3296

COMPLETE 700 HP USED ROTARY RIG
Ready to Drill
$52,500.00

One engine new, other engine completely reconditioned last well. 6700′ excellent drill pipe, part new. Shale shaker, light plant, wire line, rotary hose, blowout preventer, drill collars, windbreaks, butane tank and hand tools. New last well.

• H-46 Emsco 4-Speed Drawworks • 7¾″ x 18″ Power Pump • OCS Reverse Clutch • Two RXISV 12-Cylinder Gas-Butane Engines • Type B Regan Crown Block • 5-Sheave Baash-Ross Traveling Block • 300-Ton B-J Triplex Hook • 26″ Gumbo-Buster Oil Bath Rotary • B-6 Emsco Swivel • Ideal 3-Speed Rotary Table Transmission • 4¼″ x 41′ Forged Upset Kelly • NRM-145 Link-Belt Shale Shaker • 5-KW Kohler Light Plant • 10¾″ "Autolock" Blowout Preventer

Tongs, Elevator, Links, Slips, Weight Indicator, Water Pump, Wire Line, Rotary Hose, Tool House, Core Barrel, Tool Box, Overshot, Casing Elevators, and Spiders, Line Pipe, Mud Lines, Jets, Rathole and Mousehole, Back up Post, Wind Breaks, Hand Tools, Miscellaneous Piping, etc.

Steam-cleaned and ready for inspection at our Oklahoma City Yard.

LUCEY PRODUCTS CORPORATION **910 S. BOSTON, TULSA, OKLA.**

EQUIPMENT FOR SALE

275′ OF 20″ 90# casing; 300′ of 16″ 70# Lapweld; 300′ of 16″ Seamless; 500′ of 13″ 50# Lapweld ordinary; and 500′ of 13″ Seamless casing. P.O. Box 875, Wichita, Kansas.

FOR SALE: New Drawworks - Brewster 60-B Skid Mounted Complete with Mast, table and 6-SREU Waukesha $10,000.00. Box B-735, The Oil and Gas Journal, Tulsa, Oklahoma.

WELL DRILLING Machines, Spudders. Standard Outfits. Complete stock cable tools Used equipment reconditioned. Some Government surplus. Pressey & Son, Pueblo, Colorado.

1—Model 5000 FRANKS truck motor driven double drum spudder, complete with Model A-8 International truck powered with PA-100 motor, 50 ft. double pole telescoping pipe mast, new 3500 ft. 7/8″ drilling line, sand line and some tools. Located in Tulsa, Oklahoma. Brown & Tomer Drilling Co., 712 Thompson Building, Tulsa, Oklahoma. Phone 2-9439.

ELECTRICAL EQUIPMENT

1 Allis-Chalmers Generator, 350 Volts, citer, Shunt Wound, 15-KW, 120 Amp.-125 Volts, 800 to 1200 RPM, Ser. #3196CK-120DEB-1-1.

1 Allis-Chalmers Type EB120 D.C. Ex- 715 Amps., 1200 RPM, Serial #132379.

1 Allis-Chalmers 300 HP—350 Volts, 1000 RPM, 699 1 hour or 520 Cont. Svc. Drawworks Motor Serial #132452.

1 Allis-Chalmers Type EM-2 Switchboard Complete (Ser. #3X5334) with Cutler-Hammer Control (Ser. #B105711) with all Cables and (1) 1¼ HP D.C. Compound wound Blower Motor, 10 Amps., 125 Volts., 1800 RPM, Ser. #9076MK-51DE-1.

This equipment can be seen at the Makin Drilling Company yard at Eunice or write Box 131, or phone 131, Hobbs, New Mexico.

NEW GENERATOR SETS

110 LEROI PE 84D
20 KW Single Phase—F.O.B. Cincinnati $720

8 HERCULES PE 78G
10 KW Single Phase—F.O.B. Cincinnati $495

WELDERS, GUARANTEED CONDITION (Built in 1943, Used a Short Time)
300 G.E. PORTABLE WELDERS,
300-AMP F.O.B. Ogden, Utah $600

100 300-AMP P&H HANSEN ARC WELDERS
220/440 volts—F.O.B. Cincinnati $125

300 400-AMP LINCOLN ARC WELDERS
440 Volts—F.O.B. Cincinnati $125

NEW GALVANIZED CORRUGATED NESTABLE CULVERTS
18″ $1.00 Per Ft.—48″ $3.25 Per Ft.
F.O.B. Cincinnati
Send for Catalogue on Hardware; Textile & Automotive Items.

INDUSTRIAL ENTERPRISES INC.
1408 First National Bank Bldg.
Cincinnati 2, Ohio, CH 5997-5998

EQUIPMENT FOR SALE

FOR SALE: Model K Cardwell, perfect condition w/5″ & 7″ tools complete. Morris & Son, Box 107, Carmi, Illinois.

FOR SALE: New 3″ and 4″ Drill Pipe with Tool Joints standard weights R-2. Box B-734, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRONIC GRAVITY METER

will read gravity changes of less than 1-7 power. Should you be interested in a subsurface map of your lease holdings,

Write **Larry L. Smith**, Electronics & Geo., Monticello, Kentucky.

HYDRAULIC PUMPS

Aldrich Pump Co. Vertical Triplex HYDRAULIC PUMPS, 2¾″ x 8″, equipped with Herringbone gears, 67.5 GPM. Maximum pressure for intermittent duty 2,200 lbs., for continuous duty 1,800 lbs. Pump and motor mounted on common bed plate.

Motors are 75 HP, 3/60/220-440 volts, 1740 RPM. Complete with starting panel, consisting of G.E. motor starter switch, push button control, square "D" Switch, and capacitator.

Purchased new 3½ years ago. Excellent condition. Available for immediate delivery.

CONSOLIDATED PRODUCTS CO., INC.
17-20 Park Row, New York, N. Y.

SERVICES

W. P. JENNY
Consulting Geologist and Geophysicist

Micromagnetic Surveys
Aerial Magnetic Interpretations
Geophysical Correlations

Charter 4-4777 — 1404 Esperson Bldg.
Lehigh 0940 — HOUSTON, TEXAS

PATENT ATTORNEYS

PATENT AND Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5. D. C.

FOR SALE—MAPS

MAP showing oil and gas fields and principal anticlines of Appalachian oil regions from New York state to Tennessee. Also showing name of fields, and pay sand and its depth. It is especially useful in connection with present and future deep sand operations. Size 28 by 78 inches. Price $7.00. Also good water drive proposition for sale or operation deal. W. H. Heydrick, 7367 North Damen Ave., Chicago 45, Illinois.

EQUIPMENT WANTED

WANTED TO BUY: Used plate out of riveted steel Tanks, 3/16, ¼ & 5/16, also 37,500 bbl. Tanks 55,000 & 85,000 bbl. Tanks. Independent Tank Co., Box 102, Seminole, Oklahoma.

WANTED

STEEL STORAGE TANKS

500 to 75,000 Barrel Capacity
Any Type

MAIL—WIRE—or PHONE
Your Offering

IRON & STEEL PRODUCTS, Inc.
42 years' experience

13412 S. Brainard Ave., Chicago 33, Ill.

"ANYTHING containing IRON or STEEL"

SITUATIONS WANTED

LANDMAN, Expert on titles, good trader in the market for a job. C. Campbell, 6075 Franklin Ave., Hollywood 28, California.

REGISTERED PETROLEUM ENGINEER Age 34. B.S. degree. Thoroughly experienced in oil and gas production, salt water disposal, etc. Present company being sold. Box 1286, Fort Worth, Texas.

PRODUCTION SUPERINTENDENT: 22 years with one company. Experienced in production and workover operations. Excellent performance record. Can furnish highest reference as to character and ability. Box B-791, The Oil and Gas Journal, Tulsa, Oklahoma.

RADIO ENGINEER thoroughly familiar with transmitting and receiving equipment desires permanent employment or field service jobs. Carry full equipment in car at all times and can leave on short notice. W. M. Morgan, Keithville, La., Shreveport, phone 4-4075.

WANTED: Work in the Petroleum Industry. Experience 11½ years Gasoline Plant operation and 5 years in Electronics. At present radio maintenance foreman for Major Airline and living in South America. Will accept work in South America. Speak Spanish fluently. Box B-804, The Oil and Gas Journal, Tulsa, Oklahoma.

Executive
SALES ENGINEER
Nine years' experience
all types oil operations
Domestic or Foreign
Box 2338 — Dallas, Texas

HELP WANTED

MAN—Under 45, experienced in petroleum production accounting. Willing to locate in Kansas City. State age, experience and salary requirement in first letter. Address Personnel Division, P.O. Box 2359, Kansas City 13, Missouri.

WANTED, assistant professor of petroleum engineering. Training should include experience with well equipment, construction, strength of materials, and laboratory testing Address reply to Box B-797, The Oil and Gas Journal, Tulsa, Oklahoma.

DEVELOPMENT GEOLOGIST. Age 25-30, M.S. degree Geology. Above average academic background. 2-3 years' experience preferable. Starting salary $260-$400 depending on experience. Major Oil Company. Application must state complete qualifications and references. Box B-801, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: MECHANICAL or Metallurgical Engineer—familiar with the inspection of refinery fractionating equipment, furnaces, heat exchangers and pressure vessels and having experience to qualify for making recommendations for renewal or repairs to the equipment. Experience on catalytic cracking units preferred, but not essential. In replying, please send full details of experience and education. Snapshot (if available). Box B-565, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY EQUIPMENT FOR SALE

One—3″ Pacific Hot Oil Pump, ten stage, direct connected to 600 H.P. 3 stage, G. E. Steam Turbine.
One—3″ Pacific Hot Oil Centrifugal Pump, seven stage, direct connected to 400 H.P. 3 stage, G. E. Steam Turbine.
One—30 x 7 x 20 Burnham Twin Simplex Hot Oil Pump.
1,975 Ft.—3¼ I.D. x 4¼″ O.D. Tubing, 4-6 Chrome—in 25-ft. lengths, plain end.
One—Fractionating Tower, 6 ft. x 39 ft. x 3/8″ shell—20 steel bubble trays.
Two—5 ft. x 30 ft. Pressure Vessels, lined with lead and acid resisting brick
Pressure vessels to 30,000 gals. capacity, Centrifugal and Reciprocating Pumps, Heat Exchangers, Valves.
One—5 ft. x 92 ft., 250 lbs. W. P. Vessel

PROCESS CONSTRUCTION CO., INC.
20700 So. Figueroa St. — Phone—Pleasant 26366
Torrance, California — Los Angeles

HELP WANTED

WANTED by large Oil Company, graduate Civil Engineer between 25 and 35 with several years' surveying experience. Box B-802, The Oil and Gas Journal, Tulsa, Oklahoma.

WE NEED a wider variety of applications from Sales Engineers and young men wanting to be Sales Engineers, to properly fill the good jobs we have on file. No fees. Oil Industry Employment Service, P. O. Box 2603, Tulsa, Oklahoma.

WANTED GEOLOGIST: Must have at least three years' experience in microscopic examination of well cuttings and the ability to do surface geology. Location in Rocky Mountain Area. Salary based on experience. Give full particulars. Box B-773, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT

University graduate with degree in Business Administration or Commerce and Finance. Some business experience essential. To qualified man, major oil company in New York City offers position with opportunity for advancement. Please furnish complete information regarding education, experience, marital status, and salary desired. Replies confidential. Box B-793, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

GRAVITY PARTY CHIEFS, meter operators, and computers for domestic work with progressive company. Chance for rapid advancement. Salary open. Box B-799, The Oil and Gas Journal, Tulsa, Oklahoma.

C. E. GRADS and Surveyors for transit and level work in connection with gravity operations with young fast growing concern. Box B-798, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Accountant experienced in oil production accounting and tax problems of oil producers and some knowledge of secondary recovery. Permanent with old reliable company. Salary range $3,000 to $4,000 per year. Office located, Country Club Plaza, Kansas City, Mo. Box B-746, The Oil and Gas Journal, Tulsa, Oklahoma.

METHODS ANALYST

Major oil company in New York City has vacancy for experienced man capable of analyzing, developing, and installing office systems and procedures. Applicant must be university graduate with degree in Business Administration or Commerce and Finance. Ability to prepare impartial and persuasive reports is also essential. Please furnish complete information regarding education, experience, martial status, and salary desired. Replies confidential. Box B-794, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

MICRO-PALEONTOLOGIST
Venezuela

To study well and surface samples in company laboratory in Caracas. College degree and at least 3 years' commercial experience required. Salary commensurate with experience. Living allowance in addition. Foreign experience and knowledge of Spanish desirable. Write, giving details of training, experience and salary requirement to:

The Atlantic Refining Co.
RM. 900, BOX 7258
PHILA. 1, PA.

COLLEGE GRADUATES WANTED

for work in Saudi Arabia

Geologists
Paleontologists
Petroleum Engineers
Safety Engineers

Send full particulars and transcript of college record to—

ARABIAN AMERICAN OIL COMPANY
200 Bush Street—Room 615
San Francisco 4, California

CHEMISTS
PHYSICISTS
ENGINEERS

Phillips Petroleum Company has openings in its Research and Development Departments for chemists, physicists and chemical engineers, with or without experience.

Positions to be filled are primarily in research laboratory on activities associated with fuels and lubricants, petroleum chemicals, exploration and production. Other positions available in the design and operation of pilot plants and commercial units, market research and technical sales. Some positions open for women with technical training.

Location Southwest. For details, write R. R. Couch, Research and Development Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

WANTED

PLANT SUPERINTENDENT

For 18,000 Barrel Midcontinent Refinery.

Prefer a technically trained man who can handle labor, and is thoroughly experienced in operations. The salary will be in proportion to the applicant's ability. Please furnish full details of education, experience, age, references, etc. Your reply will be considered strictly confidential.

Box B-783, The Oil and Gas Journal,

Tulsa, Oklahoma

WANTED

Electrical Engineer to take charge of all electrical equipment in large independent Mid-Continent refinery including power generation, instruments, power distribution, etc. In replying, please furnish full details of experience and education.

Box B-784, The Oil and Gas Journal
Tulsa, Oklahoma

Advertiser, large and well established manufacturer of comprehensive line of special refractories, catalyst supports and porous mediums, looking for man for technical field sales work in the petroleum industry. Training in the selection and application of Company's products will be provided but we need a man native to or well acquainted with the Southwest area and having knowledge of the chemical phases of this industry. Prefer graduate chemical engineer under 30. Give details of your education, experience if any, and marital status. Field and headquarters interviews arranged for men with acceptable qualifications. Replies will be held in strict confidence. Box B-800, The Oil and Gas Journal, Tulsa, Oklahoma.

PERSONAL

INFORMATION WANTED
Approximately thirty-five years ago Frederick R. Scholefield left Chicago for Oklahoma or Texas to participate in the oil business. Any information as to his activities past or present will be greatly appreciated. J. A. Panter, 1002 W. Park Drive, Midland, Michigan.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on Request. Burkhart Printing & Stationery Company, 113 South Cincinnati, Tulsa 3, Oklahoma.

ROYALTIES

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma

SEE A. L. BOWLES, Ada, Oklahoma, for drilling deals, leases, royalties.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA'S oil fields are expanding—buy royalties profitably—ahead of the drill—now! Free map. Landowners Royalties Company, Box 1225, Great Falls, Montana

We buy producing and non-producing royalties in Mid-Continent area; complete information first letter. Brittany Oil Corp., Philtower Bldg., Tulsa.

SOUTH ARKANSAS
Leases — Royalties — Titles
E. S. MILLER
222 State National Bank Bldg.
Texarkana, Arkansas

LEASES AND DRILLING BLOCKS

ARKANSAS-Louisiana-Texas leases, twenty acres up. Dollar acre up. Owners, Box 1122, Little Rock, Arkansas.

FOR SALE: Seven-eighths oil leases on 900 acres, Chaves-DeBaca Counties, New Mexico. H. B. Nordstrom, Chico, California.

FOR SALE: Oil and Gas Leases in large or small blocks in shallow territory, also small production, and leases for drilling contracts. W. P. Harley, Bowling Green, Ky.

WILL PURCHASE 80 acre lease within one-half mile of shallow test you are going to drill. Give price, map, geological and legal information in reply. Box B-805, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED with secondary recovery possibilities. Licensed engineer would buy all or part interest. Describe fully. Box B-803, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE 16-bbl. daily settled production Wilcox sand well, 40-acre lease and surface, 5-room modern house and out buildings, gross income $750 mo., price $16,000. Two Cromwell sand wells on 40-acre lease, 52 bbl. daily, $50,000; 3 Wilcox sand, 40 bbl. daily, 80-acre lease with house, possible shallow production, $50,000. L. H. Vinnedge. Box 243, Holdenville, Oklahoma. (No brokers).

FOR SALE: Oil & Gas Lease, 11, 35, 16, Montgomery County, Kansas, 210 acres, 220 wells, average depth 70 ft., average pay sand 25 ft. Strictly a repressuring proposition, preferably air. Also a logical mining project. Water and electric power on farm. Good paying gas sand at 400 ft. Wells have never been produced. Properly equipped, with intelligent operation, lease will return lucrative results. If interested please call in person as no correspondence will be answered. The price, $10,000 cash. M. J. REGAN, Coffeyville, Kansas.

Have money and material to develop proven leases for an interest. Must have excellent merit.

BOX B-792
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma, Louisiana and Illinois.
Inquiries Invited
B. D. BUCKLEY
80 Broadview Drive, Clayton (5), St. Louis, Missouri

LEASES AND DRILLING BLOCKS

FOR SALE: Ninety acres oil-producing lease, two wells, three bbl. production. Muskogee field. James Lyon, 2311 W. Broadway, Muskogee, Okla. Telephone 636.

OREGON WILDCATTER wants party to test-drill large Camas Valley holdings showing exceptional geological and geophysical possibilities for shallow wells. No stock promotion. Wm. Ziedrich, Camas Valley, Oregon.

FOR SALE

FOR SALE AT A BARGAIN
Group of brick and stone mill buildings—area approximately 62,400 sq. ft.—sturdily built sprinkler protected. Boiler House—650 H.P.—Hi-Pressure Boilers—coal and oil fired. Abundance of water. Location, near Chester, Pennsylvania, on branch of Penna. R.R., within few miles of Delaware River Refineries at Marcus Hook. Suitable also for storage, handling and shipping of bulk materials such as oils, greases, chemicals, machinery parts and supplies. Will divide into several units ifdesired. Box B-781, The Oil and Gas Journal, Tulsa, Oklahoma.

Cooperative Processing Attacked in Suit

(Continued from page 76)

case are regarded with little alarm, and a strong defense is anticipated. Under the terms of the Cotton Valley unitization and pressure-maintenance agreement entered into in early 1940, members share in production from the unit on the basis of their original participation in the unitized substances in place in the reservoir. Such shares are returned to members in kind, and the operators committee exerts no jurisdiction over distribution or sale of any liquid products. A large majority of membership interest voted to install processing equipment to fractionate stabilized distillate into finished products. Such products, including propane, butanes, gasoline, and kerosine are sold by the individual members under separate contracts for the best prices offered. As in any free market, the buyer offering the best price has been able to contract for the bulk of these products.

In order to maintain a continuous, efficient process for separation of propane, butanes, pentanes, etc., random withdrawals of the liquid fraction cannot be taken from the plant short of the finished stage. Therefore, the great majority at Cotton Valley voted to provide that members will receive their shares of production as finished products. Once finished and turned over to the members, the products may be handled as each member chooses; in fact one member recombines his share in a single pipe line, serving an adjacent refinery with a product identical to the crude stabilized distillate which was charged to the gasoline fractionation section of the cooperative plant.

Unit's Record Outstanding

As operator of the original successful unitized pressure-maintenance unit, the Cotton Valley Operators Committee has exerted a profound influence on the subsequent adoption of similar conservation projects throughout the states producing high-pressure gas and distillate. With respect to both the unit agreement and the technical aspects of its operation it has served as a model. Unit operation and development of Cotton Valley was approved and supported by the State of Louisiana, which requires 100 per cent participation in such units as are considered necessary to conserve natural resources.

The war record of the operators committee is outstanding. In addition to its production of vital constituents for fuel and synthetic-rubber manufacture, it cooperated willingly in the Government's important program for obtaining toluene, a raw material for explosives. Learning that Cotton Valley distillate contained a much greater fraction of toluene than any other similar major source, the Government offered the operators committee the necessary financial aid and priorities on equipment for a toluene extraction unit to be incorporated in the Cotton Valley plant. Declining the financial aid, members of the committee unanimously agreed to construct such a unit with their own funds. Materials and equipment were obtained and fabricated cooperatively by committee members largely without priority grants, and the new unit produced a total of 622,406 bbl. of toluene concentrate, containing the unusually high fraction of 45 per cent toluene and methylcyclohexane.

Toluene Plant Now Utilized

As an interesting sidelight, the toluene plant is now being utilized for the further processing of distillate now under attack. Toluene concentrate, produced at the urgent wartime request of the Government is included among the products named in the suit.

Disagreement of a minority interest in the operators committee is believed an important factor in the filing of this suit. Investigations into Cotton Valley operations have been in progress for well over a year. As such, the suit appears to arise from a situation peculiar to Cotton Valley and may not represent the first of a series of similar actions. While its probable outcome is not viewed with general alarm, the implications of only partial success by the Government are regarded as broad and serious.

Defendants in the case are: Ohio Oil Co., Hunt Oil Co., Magnolia Petroleum Co., Union Producing Co., Fohs Oil Co., Bodcaw Cotton Valley Co., Inc., Grant Oil Co., Midstates Oil Corp., North American Oil Consolidated, Root Petroleum Co., Woodley Petroleum Corp., Jabco, Inc., Stanolind Oil & Gas Co., Sunray Oil Corp., Welori Lumber Corp., and the following individuals: H. L. Hunt (individually and as trustee for Hassie Hunt), H. M. Marr, and G. H. Vaughn, all of Dallas; A. G. Oliphant, Allene Oliphant, and Charles W. Oliphant, all of Tulsa; A. J. Hodges, Sydney G. Myers, Mrs. Nellie G. Myers, H. W. Perritt, W. G. Ray, E. V. Whitwell, and W. C. Woolf, all of Shreveport; Daniel W. Stewart, E. L. Stewart, and Frank B. Treat, all of Minden, La.; and W. A. Delaney, Jr., Ada, Okla.

ADVERTISERS

Air Reduction Sales Co. 1
Aluminum Industries, Inc. 8
Amazon Hose & Rubber Co. 146
American Body & Trailer, Inc. 173
American Cable Division of American Chain & Cable Co., Inc. ..... Inside Back Cover
American Car & Foundry Co. 45
American Cyanamid Co., Industrial Chemicals Div. 22
American District Steam Co. 119
American Hoist & Derrick Co. 129
American Iron & Machine Works Co. 169
American Paulin System 172
Ansul Chemical Co., Fire Extinguisher Div. 116
B & W, Inc. 180
Baker Oil Tools, Inc. 72
Baldwin-Duckworth Division of Chain Belt Company 27
Baroid Sales Division, National Lead Company 53
Born Engineering Co. 156
Brewster Company, Inc., The 43
Brown Instrument Co., The 25
Butler Manufacturing Co. 68
Byron Jackson Co. 181
Cameron Iron Works, Inc. 92
Cardwell Mfg. Co., Inc. 164, 165
Chemical Construction Corp. 20
Classified Advertising 187, 188, 189, 190, 191
Climax Engineering Co. 9
Coffield, H. H. 177
Cooper-Bessemer Corp., The 152
Core Laboratories, Inc. 19
Dallas Aero Service 174
Dallas Aircraft Sales, Inc. 130
Dallas Tank Company 15
Davis Regulator Co. 173
Dayton Rubber 24
Dean Brothers Pumps, Inc. 146
Dempster Brothers, Inc. 171
Detroit Diesel Engine Division 28
Dowell Incorporated 145
Dresser Industries, Inc. 51
Drilling Specialties Company 162
Durbin-Durco 180
Edward Valves, Inc. 39
Ensign Carburetor Company 131
Filtrol Corporation 57
First National Bank & Trust Co. of Tulsa, The 138
Fisher Research Laboratory, Inc. 175
Floridin Company, Inc. 168
Fluid Packed Pump Co. 69
Friden Calculating Machine Co., Inc. 137
Gaso Pump & Burner Mfg. Co. 157
General Controls 114
General Motors Corporation, Truck & Coach Division 38
General Paint Corporation 135
Grancell, I. H. 179
Great Lakes Steel Corp., Stran-Steel Division 10
Grove Regulator Co. 50
Guiberson Corporation 29
H & M Pipe Beveling Machine Co. 159
Haering & Co., Inc., D. W. 136
Halliett Manufacturing Company 133
Hercules Tool Company 184
Hewitt Rubber of Buffalo Division of Hewitt-Robins, Inc. 14
Hill-Hubbell & Co. 135
Hobb Swetnam Co., Inc. 129
Hughes Tool Co. ..... Back Cover
Hunt Tool Company 33
International Harvester Co. 103
International Nickel Company, Inc., The 37, 70
J P Machine & Tool Company 176
Jones & Laughlin Supply Co. 36
Kaydon Engineering Corp., The 12
Kelley Company, Ben F. 180
Kennedy Valve Mfg. Co., The 32
Keuffel & Esser Co. 114
Koch Engineering Company, Inc. 150
Landis Machine Co. 11
Lane-Wells Company ..... Front Cover
Le Roi Company 59
Link-Belt Company 5
L-K Pump Valve Co. 181
Ludlow Valve Mfg. Co., The 111
Lunkenheimer Co., The 21
MacClatchie Manufacturing Co. 3
Magnolia Airco Gas Products Co. 1
Maintenance Engineering Corp. 110
Marley Company, Inc., The 7
Marsh Corp., James P. 62
McCord Corporation 137
Mid-Continent Airlines 143
Midwestern Engine & Equipment Co., Inc. 159
Midwest Piping & Supply Company, Inc., The 65
Miller Sand Pump Co. 166
Mission Mfg. Co., The 117, 118
Mobar Corporation 109
Moon Mfg. Co. 168
Morrison Bros. Construction Co., Inc. 160
Multi-Metal Wire Cloth Co., Inc. 113
Murray Rubber Company 47
National Airoil Burner Co., The 156
National Aluminate Corp. 84
National Supply Co., The 48, 49
National Transit Pump & Machine Co. 56
New Bedford Cordage Co. 178
Nordstrom Valve Company ..... Inside Front Cover
Norris Brothers, Inc. 178
Oakite Products, Inc. 128
Oceco Division of The Johnston & Jennings Co. 120
Ohio Injector Co., The 66, 67
Oil Well Supply Co. 54
Oklahoma Contracting Co. 158
Otis Pressure Control, Inc. 4
Owen Tool Company 181
Parkersburg Rig & Reel Co. 35
Patterson-Ballagh Division of Byron Jackson Co. 40, 166
Peabody Engineering Corporation 154
Penberthy Injector Co. 83, 179
Penn Electric Switch Co. 142
Perrault Brothers 159
Petroleum Electric Power Assn. 148
Pipeline Cleaners Co. 159
Preformed Wire Rope Manufacturers 6
Pritchard & Co., J. F. 128
Railway Express Agency, Air Express Division 133
Ratigan, J. P. 46
Reading-Pratt & Cady Division of American Chain & Cable Co. 64
Reed Roller Bit Company 139, 140
Reilly Tar & Chemical Corp. 160
Reinhold Publishing Corp. 146
Republic Steel Corporation 31
Republic Supply Co. 16, 17
Rheem Manufacturing Co. 58
Ridge Tool Company, The 114
Robins Conveyors, Inc., Div. Hewitt-Robins, Inc. 14
Sampson Machinery & Supply Co. 90
Schlumberger Well Surveying Corporation 41, 42
Schramm, Inc. 18
Seismograph Service Corp. 100
Sheppard Company, R. H. 170
Smith Corporation, A. O. 34
Spang & Company 167
Squier, John P. 113
Standard Oil Co. of California 60
Standco Brake Lining Co. 180
Sterling Machinery Corp. 156
Stewart & Stevenson Services, Inc. 106
Stokes, Inc., R. A. 141
Taylor Chain Co., S. G. 137
Taylor Forge & Pipe Works 26
Thomas Flexible Coupling Co. 132
Thornhill-Craver Co. 161
Tim Flying Service 168
Trailmobile Company, The 61
Transmission Machinery Corporation 175
United Chromium, Inc. 105
U. S. Steel Corp. Subsidiaries 23, 54
United Steel Cos., Ltd., The 44
Universal Oil Products Co. 88, 89
Vapor Recovery Systems Co., The 63
Vaughn & Taylor Construction Co. 160
Victaulic Co. of America 143
Vogt Machine Co., Henry 55
Walter Motor Truck Co. 30
Warner Lewis Company 155
Waukesha Motor Company 52
Wheeling Machine Products Co. 173
White Company, David 177
Wickwire Spencer Steel Co. 113
Williamson, Inc., T. D. 160
Wilson Manufacturing Co., Inc. 134
Wilson-Snyder Mfg. Co. Div., Oil Well Supply Co. 23
Wilson Supply Co. 2
Wisconsin Motor Corporation 111
W-K-M Company, Inc. 13
Wood Conversion Company 175
Worthington Pump & Machinery Corp. 104, 122, 123
Young Engine Corp. 181

CALENDAR

June

Division of Marketing, American Petroleum Institute, Nicollet Hotel, Minneapolis, June 30-July 1.

July

Western Petroleum Refiners Association, regional technical meeting, Alma, Mich., July 16.

August

Interstate Oil Compact Commission, summer quarterly meeting Great Falls, Mont., August 11-13.

September

National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J., September 17-19.

Independent Petroleum Association of America, annual meeting, Oklahoma City, September 29-30.

Petroleum Division, American Institute of Mining and Metallurgical Engineers, regional meeting, Shirley Savoy Hotel, Denver, September 29-October 2.

October

American Society of Mechanical Engineers, Petroleum Committee conference on petroleum mechanical engineering, Rice Hotel, Houston, October 6-8.

Petroleum Division, American Institute of Mining and Metallurgical Engineers, fall meeting, Mayo Hotel, Tulsa, October 8-10.

American Association of Oilwell Drilling Contractors, seventh annual meeting, Long Beach, Calif., October 13-15.

Texas Mid-Continent Oil and Gas Association, annual meeting, Gunter Hotel, San Antonio, October 16-17.

Petroleum Division, American Institute of Mining and Metallurgical Engineers, fall meeting, Elks Club, Los Angeles, October 23-24.

November

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 10-13.

Society of Automotive Engineers, fuels and lubricants meeting, Hotel Mayo, Tulsa, November 6-7.

December

American Society of Mechanical Engineers, sixty-eighth annual meeting, Atlantic City, N. J., December 1-5.

January 1948

Society of Automotive Engineers, annual meeting, Book-Cadillac Hotel, Detroit, January 12-16.

April

Western Petroleum Refiners Association, annual meeting, Galvez and Buccaneer hotels, Galveston, April 5-7.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 21-23.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, April 26-29, Denver.

May

Natural Gas Department, American Gas Association, annual spring meeting, Rice Hotel, Houston, May 4-5.

International Petroleum Exposition, Tulsa, May 15-22.

NOMADS

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club, except annual get together, July 18, Riveria Country Club.

New York, Tulsa, and Dallas Nomads, meetings to be announced.

REFERENCE LIBRARY ST. PAUL

Petro-
neapolis,

ociation,
, Mich.,

on, sum-
, Mont.,

annual
ic City,

ation of
na City,

Institute
eers, re-
el, Den-

al Engi-
rence on
g, Rice

stitute of
eers, fall
ber 8-10.
Drilling
ng, Long

Gas Asso-
otel, San

stitute of
eers, fall
October

annual
Novem-

ers, fuels
yo, Tulsa,

cal Engi-
ting, At-

rs, annual
roit, Jan-

ssociation,
Buccaneer

on, Hotel
il 21-23.
eum Geol-
ntologists
of Explo-
ing, April

rican Gas
ting, Rice

ion, Tulsa,

nday of
ge Inn,

d Wed-
n Club,
July 18,

ias Ne-
ced.

TRU-LAY *Preformed*

for WINCH LINES

It is on winches, where there are both tough pulling and slack rope, shock loads and critical diameters, that TRU-LAY Preformed gives a convincing account of itself. Being preformed, the wires and strands in TRU-LAY are free from internal strains and stresses. This makes TRU-LAY limber, flexible, easy to bend, and so makes possible the use of Independent Wire Rope Center. This IWRC is essential to prevent crushing on the drum as well as add reserve strength against occasional overloads. TRU-LAY Preformed resists kinking and snarling, which makes it easier to handle. It resists rotating in sheave grooves and spools better on the drum. When crown wires in TRU-LAY Preformed finally do break, the ends do not wicker and become vicious jaggers. TRU-LAY Preformed is the safer, greater-dollar-value rope. Specify it—in the Improved Plow Steel grade.

Distributors in all strategic points

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Pittsburgh, San Francisco, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

HUGHES *Seal Grip* TOOL JOINTS
insure maximum economy

REMOVAL

HEAT with simple Furnace or oxy-acetylene torch to 950°F.

COOL Pipe Upset with internal water spray—keep strain on tongs until joint breaks—unscrew.

OR . . . Seal Grip tool joints are easily removed with cutting torch.

THE Hughes "SEAL GRIP" Design permits salvage of both drill pipe and tool joint by the "swelling-off" process illustrated above. If only pipe is to be salvaged, the tool joint may be removed by a simple torch cutting operation.

Hughes **TOOL COMPANY**
HOUSTON, TEXAS

Standard of the Industry